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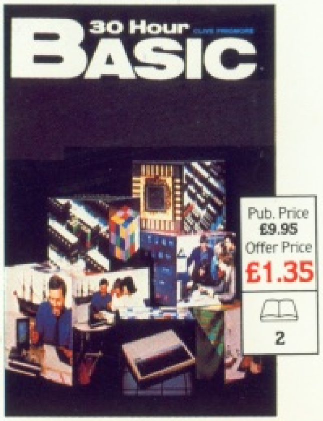
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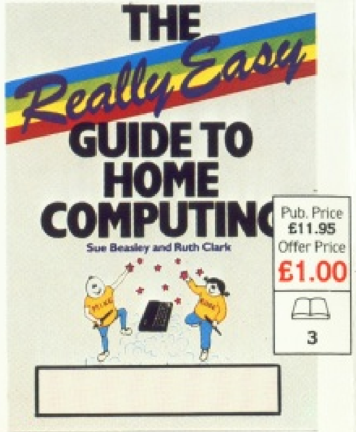
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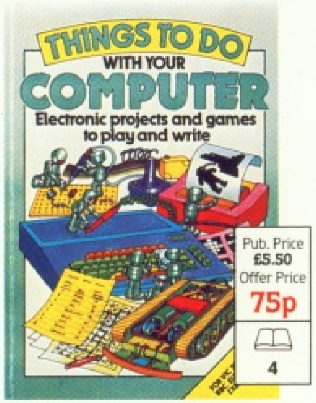
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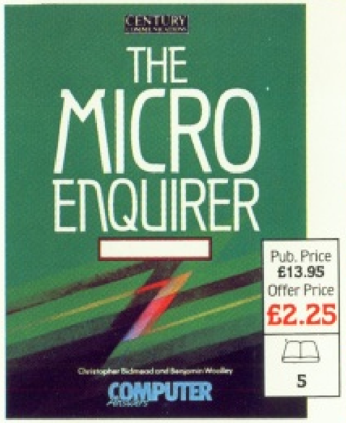
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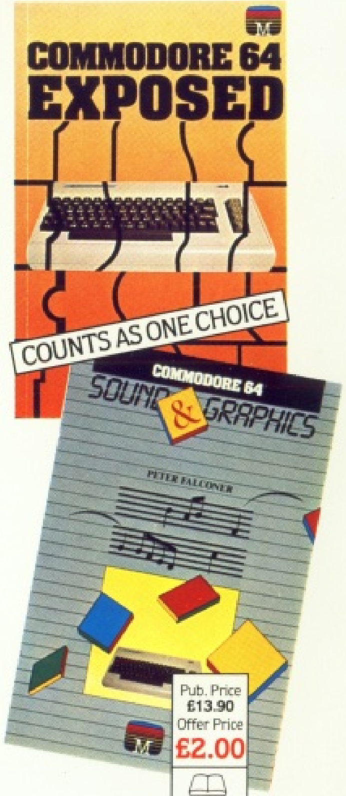
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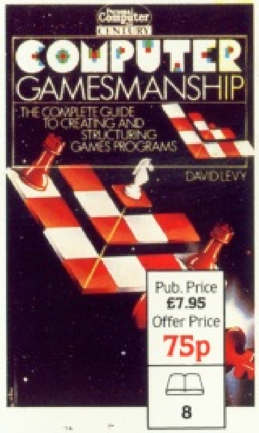
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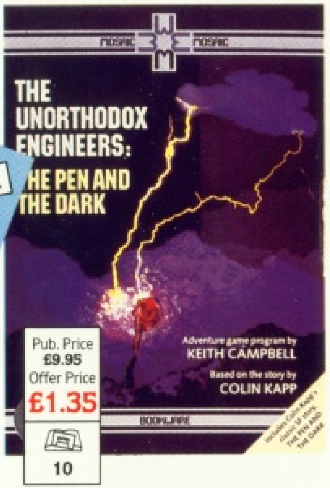
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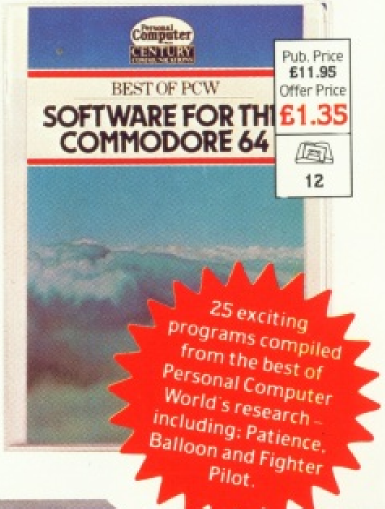
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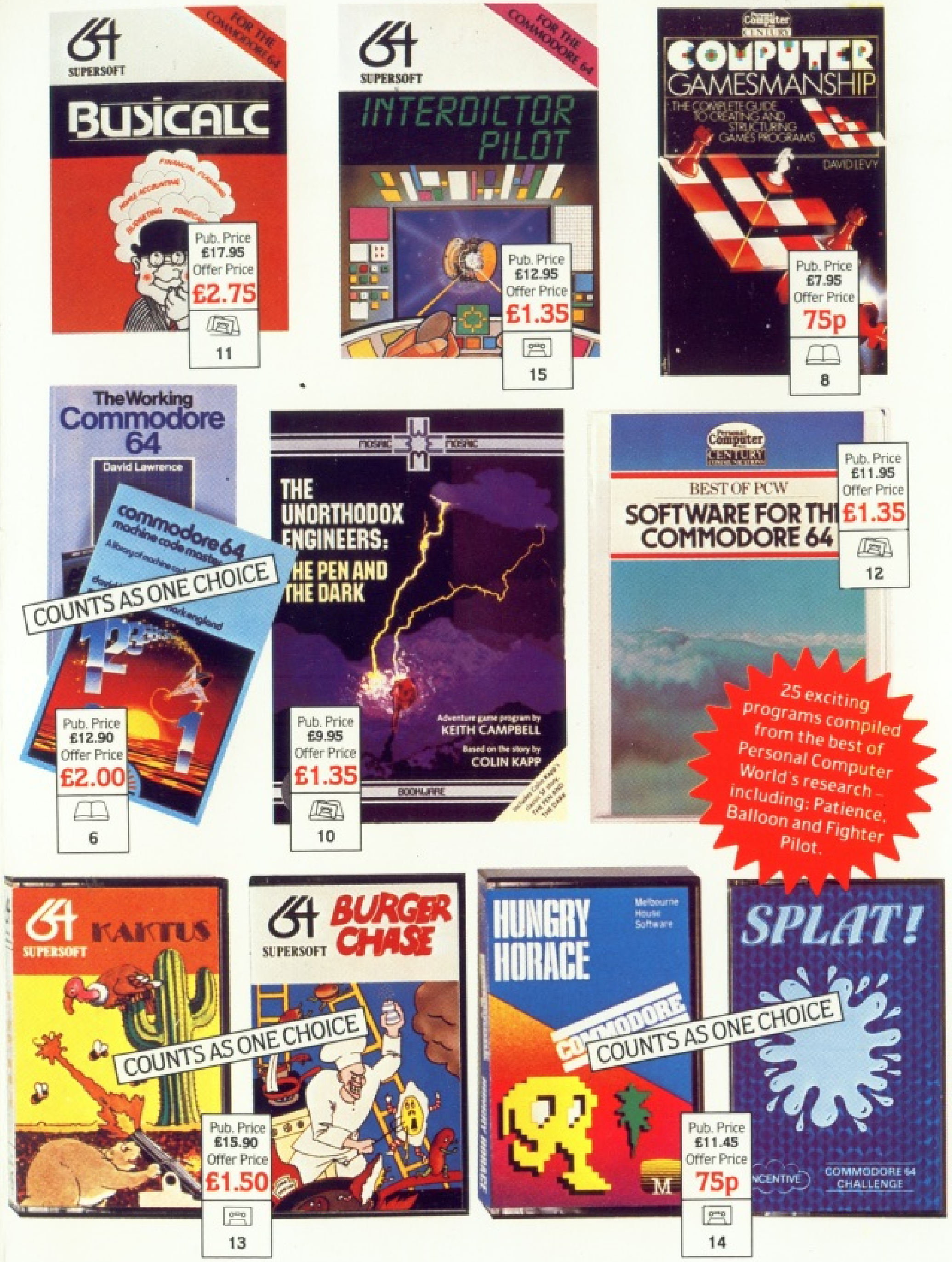
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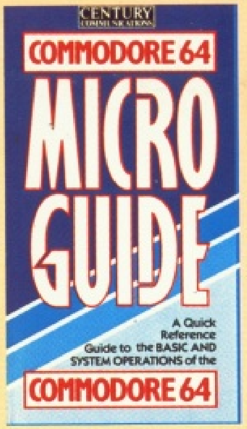
CENTURY
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MICRO GUIDE
A Quick Reference Guide to the BASIC AND SYSTEM OPERATIONS of the
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Summarises all essential user information.
Clear and concise yet comprehensive, including all BASIC commands.
Conveniently sized for hands-on use or for pocket study at any other time, the Commodore 64 Micro Guide provides a quick reference source for the busy user.
Ranging from arithmetic and logic functions to graphics, sound generation and peripheral controls, each command is clearly illustrated with easy to follow examples.
A compact format belies the comprehensiveness of this very useful work which is packed with practical hints for every Commodore 64 user.

To: The Home Computer Club,
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Please accept my application and enrol me as a member of The Home Computer Club. I wish to receive the Program magazine reviewing future items for the Commodore 64.

Send me the Introductory items whose numbers I have printed in the boxes provided below, for which you will charge me the Special Offer price (plus a total of £1.75 towards postage and packing*) should I decide to keep the items.

☐ ☐ ☐ **17C FREE**

However, if I am not completely satisfied I may return them within 10 days, my membership will be cancelled and I will owe nothing. As a member I agree to buy at least one item every two months during my membership. I understand that the minimum length of membership is one year. If after this time I wish to cancel, I may do so by giving one month's notice in writing. All books and software are described in advance in the free club magazine and are offered for at least 25% off published and recommended prices (plus post and packing). I am over 18 years of age. (If you are under 18, membership must be in the name of your parent or guardian. Please obtain their permission).

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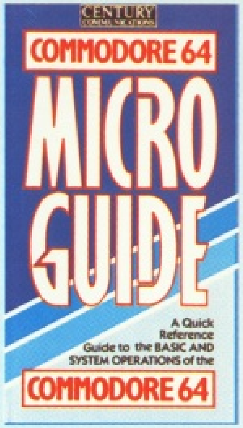
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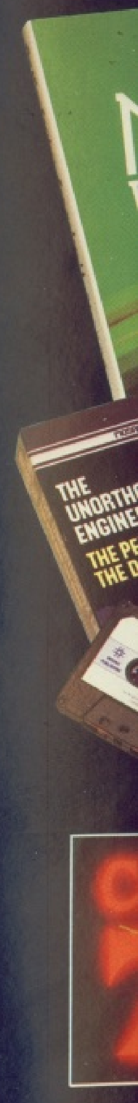
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DBMS –
Managing information

Inside the VIC

64/PET/VIC connections

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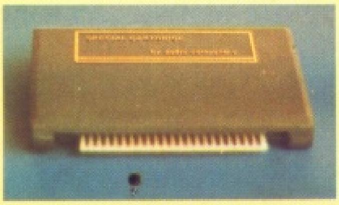
FROM AUDIO-COMPUTERS (SOLIDISK) THIS MONTH:

NEW LOW PRICES ON VIC-20 HARDWARE ADD-ONS AND THE INTRODUCTION OF NEW SOFTWARE CARTRIDGES

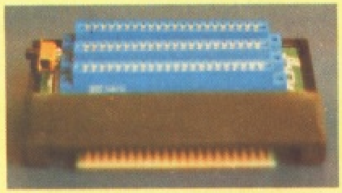
If you have already bought a memory cartridge for your VIC-20 computer, we still have many exciting items to offer, under the heading 'FURTHER EXPANSION'. They are perfectly compatible with all Commodore and many other manufacturers products.

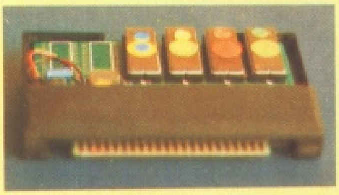


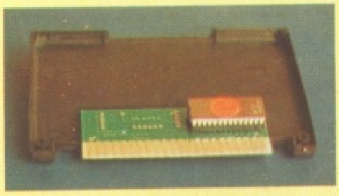
NEW LOW PRICE ON 16K MEMORY CARTRIDGE:

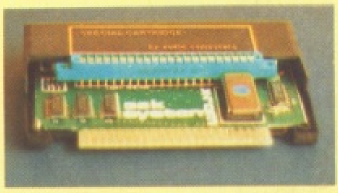
Any program sold for the VIC-20 with 8k or 16k extra memory will run with the SRC16.
The NEW PRICE of the SRC16 is now only £27.00, including VAT and manual.
It is important to know what else you can do with the SRC16 other than running big programs.
1) The SRC16 can be upgraded to 32k bytes of RAM at a fraction of the cost of a 16k cartridge. This upgrade costs only £11.00
2) The SRC16 has an X-ROM SOCKET. Games or utilities ROMs such as SCREEN ROM or SOUND ROM can be bought separately and used in this socket. Each software ROM costs around £5-10.00.
3) The SCR16 can have an EXPANSION SLOT built in. This important fact should be noted, since many VIC users experience fitting problems and extra expense when adding a Programmer's AID toolkit cartridge or the Machine Code Monitor Cartridge to their system. With many other low cost 16k memory cartridges, the user will have to buy a multi slot motherboard just to accommodate any extra cartridges. This feature alone could save you as much as £20! The SLOT is the exact reproduction of the expansion port into which the SRC16 is inserted and will cost you only £3.00. Right now you can choose any of the extra features to be built into your SRC16 cartridge. Simply tick the option boxes shown.

FURTHER EXPANSION TO THE VIC-20 COMPUTER:









1) 3 SLOT MOTHERBOARD:

for those for whom it's too late to buy a SRC16 cartridge or who want more than just memory. The 3 Slot MOTHERBOARD is not without special interest:
a) A Memory Select System allows the user to add the memory capacity of 2 RAM cartridges — for example, an SRC16 and a Commodore VIC-1111 can be used together to provide 32k bytes.
b) An optional 8k Memory System, very flexible, that will give 11775 bytes free or 6655 bytes free in the Low Res area or occasionally 8k bytes at $A000 to $BFFF for developing your own Autostart program can be added. Furthermore, if you then add your SRC16, you will get 28159 bytes free for your VIC 20!
c) 2 EPROM SOCKETS: this feature is very much appreciated by most users and has been added only very recently. You can use either 4k EPROMs (2732) or 8k EPROMs (2764) in these sockets. Each EPROM can be activated individually exactly as if you had 2 extra cartridges in your system!

2) THE VIC EPROM PROGRAMMER: (uses 2764 Eproms)

We would need a whole page to describe this exciting peripheral for your VIC-20. Briefly, the cartridge works a little like a Disk. You can insert the VIC EPROM PROGRAMMER (VEP for short) into the SLOT and activate it with:
SYS 39000
On the VEP, you will find 4 EPROM sockets. Now type in 'C' to display the catalog. It will show what is in every EPROM. It could be like this:

```
1. BIGBASIC            Simply enter 'R.1' to read the first program. You will instantly see:
2. UTILITY             *READING BIGBASIC
3. AUTOSTART GAME      *READING OK
4. BLANK EPROM         READY
```

Now you can list it, print it, run it etc. . .
The VEP does the loading of a 16k program in about 3 seconds with no loading error unless you have a bad RAM; it will then list out all the dead or missing bytes!
To put a program into EPROM, load it from tape or disk, activate the VEP and enter 'W PROGRAM-NAME' — very simple to do.
Other useful commands provided by the VEP include Hex Memory Display, Memory Change, Memory Fill, Memory Transfer, Save a Block of Memory, Load Tape, Cold Start, Centronics Printer Drivers etc. . .
You can put Basic, utility or autostart games onto Eprom in a similar way. The VEP will work out where your program is stored and will scan the EPROMs to find enough space to put it.
You can also use it as a self contained Eprom programmer to program, verify and copy Eproms.
Utility and Autostart EPROMs made with the VEP can be used on our Motherboard or on our BLANK SOFTWARE CARTRIDGES and used as any software cartridges.
We supply a small manual together with the VEP showing how you can write an Autostart program, in Basic and in machine code. We will also supply you with a free Blank EPROM and a free Blank Software Cartridge to get you started.
A word of warning: we have developed this equipment to help users in materialising sellable software (we are very keen to buy) and will disclaim any illegal use of it.

SOFTWARE CARTRIDGES

(insert directly into back of VIC, into Motherboard or SRC slot).
1) SCREEN CARTRIDGE: Sets the screen size within limits as small or large as you like. You can for example set the screen to 40 lines × 80 columns and a 'window' of 25 lines × 30 columns, write a letter or draw a colourful playing board and move your window with control keys or joystick. As you are typing in, the window will move along to accommodate. Basic programs can be typed in, listed and run even in 80 column format. Price £10.00.
2) SOUND CARTRIDGE: transforms your VIC into an electric organ. You can play music with the keyboard, add a second voice when it plays the 1st, a 3rd when it plays back the 1st and 2nd etc, define ENVELOPE to create effects like wailing police siren, play music within basic program without slowing the speed of Basic. In short, the sound Rom makes the VIC as tuneful as the BBC micro or the ATARI. Price: £10.00
These 2 cartridges are also available in chip form. You can use the chips in the Motherboard or in the X-ROM socket of your SRC16. Price: £8.00 for either of the 2.
3) MORE CARTRIDGES will be released. We would like to market your programs in cartridge form. Alternatively, we can supply blank cartridges at very competitive prices for commercial use. We are just a phone call away so if you have a good idea, why not give us a ring?

SUMMARY	PRICE/U INCL. VAT
SRC16	£27.00
OPTIONAL EXTRAS FOR THE SRC16:*	
UPGRADE TO 32K	£11.00
EXPANSION SLOT:	£3.00
FURTHER EXPANSION:	
3 SLOT MOTHERBOARD:	£19.95
OPTIONAL EXTRA 8K FOR MOTHERBD*	£16.00
VIC EPROM PROGRAMMER (+ free gift)	£39.00
EXTRA 2764 BLANK EPROM:	£6.00
BLANK SOFTWARE CARTRIDGE:	£3.00
SOFTWARE CARTRIDGES:	
SCREEN CARTRIDGE:	£10.00
SCREEN ROM ONLY:	£8.00
SOUND EFFECT CARTRIDGE:	£10.00
SOUND EFFECT ROM only:	£8.00
Post and packing:	£1.00
TOTAL:	

*I enclose a cheque/postal order payable to SOLIDISK LTD for £:
*Please charge my Access/Barclay credit card account No:
(*Please delete/complete as applicable)

....

Signature

Name: Mr/Mrs/Miss: ....

Address: ....
....
....

Please note: optional extras cannot be purchased alone. Also, if you wish to purchase them at a later date, SRCs and Motherboards must be returned together with the appropriate payment + £1 P+P. We regret we cannot accept orders of less than £10.00. All prices include VAT at 15%. Europe: deduct VAT, add £3.

Official UK dealers:

SUMLOCK, Manchester, Norman DAVIS, Mill Hill, GODFREY'S, Basildon, CURRY'S MICROSYSTEM chain store.

Official European distributors:

Benelux: ECD, Delft Tel 015 134429.
France: RUN informatique sarl, Paris Tel (01) 581 5144.
Germany: VOBIS Data computer GMBH, Aachen Tel (0241) 50 00 81.
SCHAEFER, Roetgen Tel (0240) 88 319.
Italy: SOLIDISK Italia, Inglesias (CA), Tel 0781 22529.
Portugal: LANDREY Engineering, Lisboa Tel 681243.
Sweden and Norway: DIGILOG, Goteborg Tel 031 20 29 00.

Thank you for the interest shown. Marketing Manager: H. PERRY

TO: SOLIDISK TECHNOLOGY LIMITED
(T/A AUDIO COMPUTERS)
87 BOURNEMOUTH PARK ROAD
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ESSEX SS2 5JJ UK

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FEBRUARY 1984

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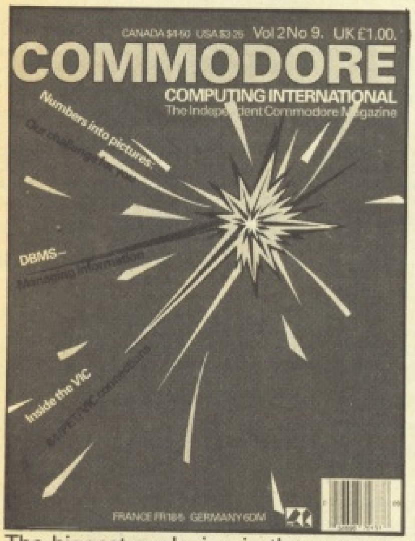

The biggest explosion in the computer world is in robotics. In this issue we take a look at a computer controlled robot.

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PRODUCT SURVEY 87
Managing all the information about database management systems

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64 software

Why put up with second best when we can offer you a real choice of software for your Commodore 64? Here are some of the 250+ GAMES:

■ **3D Time Trek** ANRG 5.75 ■ **Arcadia 64** IMAG 5.50 ■ **Attack of the Mutant Camels** HES r25.00 LSFT 6.74 ☐ **81 Nuclear Bomber** AHGC 11.50 ☐ **Choplifter** BBND r27.00 ☐ **Combat Leader** STSI warg d29.00 ☐ **Early Games series for Children** (5) CONT d21.00 21.00 ■ **Falcon Patrol** VIRG 6.95 ■ Final Flight MMG fsim d23.00 23.00 ■ **Fort Apocalypse** SYNP d23.00 23.00 ☐ **Glaxions** OLA 7.75 ■ **Grand Master** ADGC chess 17.95 ☐ **Gridrunner** HES r29.00 LSFT 5.00 ☐ **Hexpert** ANRG 7.75 ■ Hover Bovver LSFT 6.75 ☐ **Hungary Horace** MELH 5.75 ☐ **Hustler** BB 5.99 ■ **Jump Man** EPYX d27.50 27.50 ☐ **Kaktus** SSFT d10.00 8.00 ☐ **Knights of the Desert** STSI warg d29.00 29.00 ☐ **Laser Zone** LSFT 6.75 ☐ **Mangrove** SSFT d10.00 8.00 ■ **Matrix 64** LSFT 6.75 ☐ **Midway Campaign** AHGC warg 11.50 ☐ **Monopole** RAB 5.75 ☐ **Moon Buggy** ANRG 7.75 ☐ **Motor Mània** ADGC 8.95 ☐ **Munchmam** SOLA 7.95 ☐ **Nukewar** AHGC 11.50 ☐ **Purple Turtles** QUIK 7.95 ☐ **Quest of Merravid** MART 7.75 ☐ **Quintic Warrior** QUIK 7.95 ■ **Renaissance** ADGC 8.95 ☐ **Scramble 64** INTM 6.75 ☐ **Seafox** BBND d29.00 ■ **Shadowfax** POST 6.75 ☐ **Silicon Warrior** EPYX r29.00 ☐ **Siren City** INTM 6.75 ☐ **Snooker** VISN 8.95 ■ **Stix** SSFT 8.50 ☐ **Super Dogfight** TERM 9.50 ☐ **Tank Atak** SSFT d10.50 8.50 ☐ **The Fabulous Wanda . . .** GAMA 7.95 ☐ **Vortex Raider** INTM 6.75 ☐ **Yahtcee** ANIK 7.95 ■ STAK lightpen and rifle games: Plus all the latest games including for example **The Blue Max** SYNP cd35.00 ■ **Draughts, Go, Life, Lost in the Labyrinth, Othello, Seek & Destroy, Shuffle 5.75** (lightpen 28.00)

The software lists show, in order: the product **name/producer/price prefix** (to indicate cartridge-<r> disk-<d> and no prefix for cassette. Producers are abbreviated (SSFT: Supersoft) for identification, and help to identify like-named products for price checking or ordering. The product types where differing slightly from others in the same grouping are: **ass(3)(u):** three-pass assembler (+utilities) **comp:** compiler **dbu:** database (code)writer **intf:** interfac **madv:** mystery adventure **mon(a)(u):** monitor (+assembler) (+utilities) **pred:** programming tutorial **prog:** programming utility **sadv:** space adventure **stat:** statistics **txed:** texteditor **wpt:** wordprocessing + terminal software **wpu:** wordprocessing utility or link program.

**PLEASE SPECIFY CHOICE OF DISK <d>
CARTRIDGE <r> OR CASSETTE**

DATAFILES/DATABASES

■ **CodeWriter** DYNA dbu d85.00 ☐ **Combined Database** ANIK 12.95 ☐ **Data Manager** TIME d18.00 18.00 ■ **Diary 64** KOBR r40.00 ☐ **EasyFile** CBM d75.00 ☐ **FCM** CONT d35.00 ☐ **Home Inventory** CRTV 10.75 ☐ **Infomast** RAB dbu d90.00 ☐ **Inquire-Pac** IMPX d45.50 ☐ **Magpie 64** ADGC dbu r95.00 ☐ **MicroFiler 64** STAG d68.99 ■ **Oracle 64** KOBR d100.00 ☐ **Research Assistant** TOTL d30.00 27.00 ☐ **Simple File** SISO d69.00 ■ **Superbase 64** PREC dbu d97.00 ■ **The Recipe Box** ARM d15.00 ☐ **TOTL. Time Manager** TOLT d30.00 27.00

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☐ **Bailiff** SULI 9.95 ☐ **Besieged** SULI 9.95 ☐ **Biology** CBM 9.99 ☐ **Chemistry** CBM 9.99 ☐ **English Language** CBM 9.99 ☐ **Face Maker** SPNK r24.00 d25.00 ☐ **Geography** CBM 9.99 ☐ **Get it Right** SULI 9.95 ☐ **Golden Apple** SULI 9.95 ☐ **Grammar Tree 1** SULI 10.95 ☐ **Grammar Tree II** SULI 10.95 ☐ **Grammar Tree III** SULI 10.95 ☐ **Happy Tutor Typing Aid** IMPX d14.00 14.00 ☐ **Hey Diddle Diddle** SPNK d21.50 ☐ **History** CBM 9.99 ☐ **Just a Mo** SULI 9.95 ☐ **Kindercomp** SPNK r21.00 d21.50 ☐ **Masterbard I** SULI 12.95 ☐ **Mathematics I** CBM 9.99 ☐ **Mathematics II** CBM 9.99 ☐ **Memory Trainer** EINS d42.00 ☐ **Micro Addition** HAYD d21.00 21.00 ☐ **Micro Division** HAYD d21.00 21.00 ☐ **Micro Multiplication** HAYD d21.00 21.00 ☐ **Micro Subtraction** HAYD d21.00 21.00 ☐ **Patrick Moore: Astronomy** CBM 9.99 ☐ **Physics** CBM 9.99 ☐ **Quizagon** CPNT d29.00 ☐ **Rhymes & Riddles** SPNK d21.00 ☐ **Speed Reader II** DUSN d47.50 ☐ **Time Traveller** SULI 9.95 ☐ **Towering Inferno** SULI 9.95 ☐ **Turtle Trainer** HES r28.00 ☐ **Turtle Tutor** HES r28.00 ☐ **Typing Tutor + Word Invaders** ACDM d18.00 15.50 ☐ **Wordmaster** SULI 9.95 ☐ **Wordpower** SULI 9.95

ADVENTURE GAMES

■ **Adventure Quest** LEV9 9.50 ☐ **Arrow of Death I** C8 madv 9.75 ☐ **Arrow of Death II** C8 madv 9.75 ☐ **Aztec Tomb** AGTA 7.75 ■ **Blade of Blackpoole** SRSS d27.50 ☐ **Circus** C8 madv 9.95 ■ **Colossal Adventure** LEV9 9.50 ☐ **Conflict** MART 14.75 ☐ **Cosmic Capers** SSFT d10.00 7.50 ☐ **Curse of Ra** EPYX 13.50 ■ **Deadline** INFO madv d34.50 ■ **Dungeon Adventure** LEV9 9.50 ☐ **Escape from Pulsar 7** C8 madv 9.95 ☐ **Feasibility Exit** C8 madv 9.95 ☐ **Fool's Gold** ROMK 6.75 ☐ **Galaxy Conflict** MART 14.75 ☐ **Gateway to Apshai** EPYX r26.00 ☐ **Goblin Towers** SSFT d10.50 9.00 ☐ **Golden Baton** C8 madv 9.95 ☐ **Gruds in Space** SRSS d27.50 ☐ **In Search of the Most Amazing Thing** SPNK d21.50 ☐ **Perseus & Adromeda** C8 madv 9.95 ☐ **Ring of Power** QUIK 9.95 ☐ **Snooper Troops: Case 1** SPNK madv d28.00 ☐ **Snooper Troops: Case 2**SPNK madv d21.00 ■ **Snowball** LEV9 sadv 9.50 ■ **Starcross** INFO sadv d29.00 ■ **Suspended** INFO d36.00 ☐ **Sword of Fargoal** EPYX d20.50 20.50 ■ **Telengard** AHGC 16.50 ☐ **Temple of Apshai** EPYX r20.00 d24.00 ☐ **Ten Little Indians** C8 madv 9.95 ☐ **The Cracks of Fire** SSFT d10.00 7.50 ■ **The Hobbit** MELH 14.50 ☐ **The Island** SPRB 9.75 ☐ **The Streets of London** SSFT d10.50 9.00 ☐ **Time Machine** C8 madv 9.95 ☐ **Token of Ghall** INTM 6.75 ☐ **Tombs of Xeiops** ROMK 6.75 ☐ **Upper Reaches of Apshai** EPYX d13.50 13.50 ■ **Witness** INFO madv d35.00 ☐ **Wizard of Akyrz** C8 madv 9.95 ■ **Zork I** INFO d29.00 ■ **Zork II** INFO d29.00 ■ **Zork III** INFO d29.00

WORDPROCESSING

☐ **Bank Street Writer** BBND d50.00 ☐ **Blitztext** ECMP wpt d47.50 ☐ **BusiWriter** SSFT r53.00 d43.00 ■ **EasyScript** CBM d75.00 ■ **EasySpell** CBM wpu d50.00 ☐ **Heswriter 64** HES r33.00 ☐ **Instawriter** INST r60.00 d27.50 27.50 ■ **Mailpro 64** KOBR wpu d70.00 ■ **PaperClip** KOBR d90.00 ☐ **Script64** RVTC d70.00 ☐ **Simply Write** SISO d46.00 38.00 ■ **TOTL.Label** TOTL wpu d19.00 16.00 ☐ **TOTL.TEXT** TOTL d34.00 31.00 ■ **Vizawrite + VizaSpell** VIZA d99.00 ☐ **VizaSpell** VIZA wpu d65.00 ☐ **VizaWrite** VIZA r75.00 d75.00 ☐ **Wordcraft 40** ADGC r89.95 ■ **Word Wizard** BB txed 5.99 ☐ **WordPro 3 Plus/64** WEGO d90.00

UTILITIES (see also PROGRAMMING AIDS)

☐ **1541 Backup** SSFT dupe d12.50 10.50 ☐ **64 Sprite Editor** STCK 5.00 ☐ **Advertiser** BB 5.99 ■ **Arrow** SSFT r43.00 ■ **Backup + File Clone** CLM copy 15.00 ■ **Centronics Interface** ADGC intf 7.95 ☐ **Compactor** SSFT d10.50 8.50 ☐ **Delta Drawing** SPNK r28.00 ☐ **Forget-Me-Not** TIME d18.00 18.00 ☐ **Graphix 64** SSFT d12.50 10.50 ☐ **Label Printer** BB 5.99 ■ **Poster Printer** BB 5.99 ☐ **Printlink 64 + cable** SSFT intf d30.00 30.00 ☐ **Rel 64** KOBR intf r35.00 ☐ **Renumber** SSFT d9.50 7.50 ☐ **Sprite Maker 64** ENGS 6.75 ☐ **Sprite/Graphics Editor** CBM 5.99 ☐ **Superfont 4.0** ENGS 6.75 ☐ **Supersort 64** SSFT d25.00 23.50 ☐ **Tagsort 64** SSFT d12.50 10.50 ☐ **Tape Merge/Append** SSFT d9.50 7.50 ☐ **The Advertizer** BB 5.99 ■ **Victree** SSFT r53.00

PROGRAMMING AIDS (see also UTILITIES)

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(a division of T Denne & Son Ltd)

New chip off the old block

MKA Limited have produced a chip switch which enables the 8250 disk drive to be converted into the now unavailable 8050 disc drive.

According to MKA installing the chip is easy.

Once installed the chip responds to an eight character BASIC command because the entire conversion program is resident on the 8250 chip. Converting back to the 8250 is achieved by entering another BASIC command.

The cost of the conversion chip is £49.95 available from Commodore dealers or direct from MKA Training Limited, Shades House, Mealcheapen Street, Worcester WR1 2DQ. Telephone 0905 612261.

$100,000 prize for best new games in the world

Fancy yourself as a games programmer? There could be a $100,000 prize waiting for you and the chance of fame!

The awards ceremony of the first international competition to find the video game of the year is expected to receive worldwide media coverage later in 1984.

This is to be the first in a series of such competitions, the avowed aim being the creation of a register of independent programmers and programs which will be sold to distributors of microcomputer software throughout the world.

The competition has been divided into six categories covering sports, simulators, arcade games, strategy games, adventures and a special section to cater for the best programe which cannot be classified as a game but provides educational or entertainment material. Prizes range from $100,000 for the outright winner and $15,000 prizes for section winners.

All winning games will carry the title 'An International Video Game of the Year – Merit Award' on retail packs and the programmers will receive 10% of the income gained from sales.

The winner of each category will all be selected in secret by a panel of experts and the awards ceremony, which will take place in London, will include a selection of international personalities. The judges will be looking for programs that represent a breakthrough in basic creative and commercial flair and games which seem to have potential but are poorly programmed may be re-programmed to a higher standard.

It is hoped that the competition, which is being sponsored by Video Games International Limited, will boost the continued growth of the video/computer games industry throughout the world. It is being advertised in 20 countries and thousands of entries are expected.

The competition is being jointly promoted by The International Register of Independent Computer Programmers Limited and the International Management Group.

Mark Mackormack's organisation, better known for involvement with sporting stars, is also involved. There will be sufficient gap between the choosing of the winners and the public announcement to enable refinement to the software and the marketing.

RU R2D2?

You've seen the film, read the book, seen and read the sequels, heard the music on record and as the introduction to computer games – now you can own a real R2D2!

The RB Robot Corporation have introduced the RB5X Intelligent Robot which is capable of carrying out several tasks. It has an arm capable of lifting and carrying loads of up to 12 ounces.

One of the novel aspects of the robot is that it can be controlled by the human voice and respond with a voice of its own. The voice synthesis is based on a standard synthesis chip and the vocabulary of the robot is limited only by the size of its memory. It is also capable of reproducing music, whistles and sirens.

The robot can even help with the spring cleaning – a vacuum attachment at the base of the machine enables it to clean floor surfaces

The robot has been developed by the RB Robot Corporation, 14618 West 6th Avenue, Suite 201, Golden, Colorado 80401, USA.

Oric clear for takeover

Shareholders of Edenspring Investments have approved the acquisition of Oric Products International Limited, the private manufacturer of the Oric microcomputer.

This means that Edenspring will have net tangible assets of nearly £5m which will be used in the further development of Oric's products and markets.

Interpod price cut by 25pc

Oxford Computer Systems have announced that the price of their popular Interpod has been reduced from the original price of £125 to £99.95p. According to Alan Wyn Jones, managing director at Oxford Computer Systems the reduction is a direct result of the commercial success of the product.

Interpod is a very versatile intelligent interface for the VIC and 64 which was originally launched in April last year.

Interpod can be obtained from Oxford Computer Systems or Commodore dealers.

INTERPOD
The Intelligent Interface for the Commodore VIC and 64
INTERPOD
INTERPOD

Broderbunds New software

Broderbund Software have released three new products for the VIC and the 64.

Lode Runner and Sky Blazer are two cartridge based games that used to be for the Apple and Atari but will now run on the VIC.

In Lode Runner, the player can choose from 24 different game screens each of which contains several challenges as the player attempts to pick up treasure chests avoiding all the guards at the same time. As well as serving as an arcade game. Lode Runner is also a game generator which means the user can create his own screens and save them to disk or tape.

This is a feature which is not included in their second product, a game called Sky Blazer. With this game, the player has to destroy enemy radar, tanks and missiles using a fighter bomber. Refuelling is quite easy if the player can catch a cargo parachute but bombing is rather dangerous because it necessitates flying at a low level.

Their third product is called Bank Street Writer which is for the 64. Using this program, it is possible to move text around using the block text option, centre and indent text and view a page of text before starting printing.

The program comes on disk along with a disk based tutorial, reference manual and a free back up disc.

All of the above products are available from Broderbund Software, 17 Paul Drive, San Rafael, California 94903 USA.

Drive puts the hardware in the cable

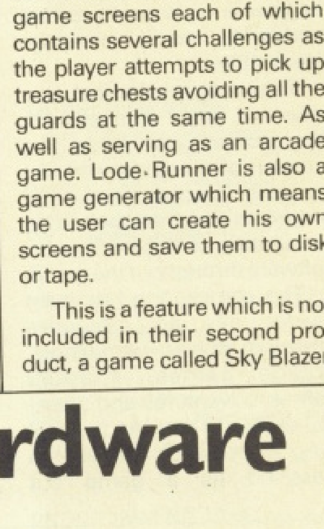
Owners of the VIC and 64 can now take advantage of a new disk drive system called the Byte Drive 500 which has been designed by ITL Kathmill and Tyrell Systems. For around £300 the user gets the 3" floppy disk drive, power supply unit, hybrid cable, user manual and disc.

The key to the whole system lies in the 34 way hybrid cable that contains all the control circuitry and hardware needed to control the Disc Operating System. The main components of this cable are 16K ROM containing all the recognition codes and the disc controller chip that can be used in conjunction with single and double density media.

The disc drive itself is a double density drive capable of producing 440 formatted Kbytes with an average file access time of three milliseconds. The floppy disc media is housed in a plastic case with an aluminium sliding door.

The power supply unit has been designed by Adam Electronics and is a 30VA model with output connections for two drives using 12V and 5V direct current. Interfacing is for the 5 and ¼" drives as well as the 3" drives. The cost of all this hardware and software is £299 whereas the disc drive on its own will cost £192.37.

This disc drive is available from ITL Kathmill Limited, The Old Courthouse, New Road, Chatham, Kent ME4 4QJ. Telephone: 0634 815464.



Interface control

Wildern Electronic have developed an interface controller that permits control of any IEEE 488 system via an RS232C data link.

This means that any device that is equipped with a serial data output can be connected to a local or remote system which, the manufactuerers claim, can be extended to any part of the world where there are serial ports available.

Inside the unit there are several switches which can reconfigure the unit to operate as a slave RS232 converter.

This product is available from Wildern Electronics, Albermarle House, Osborne Road, Southsea, Hampshire PO5 3LB, telephone 0705 831041.

METAGALACTIC LLAMAS BATTLE AT THE EDGE OF TIME

A fast and original game for the unexpanded VIC. Challenging and colourful, with good sonics and a unique game action and design, this promises to be the most exciting new 3.5K VIC game since the introduction of GRIDRUNNER nearly a year ago. **£5.50**

LASER ZONE

Experience Laser Zone – an utterly NEW totally ORIGINAL masterpiece of Video games design. Learn to control two spaceships at once. Feel the EXHILARATION as, after long hours of practice, you control the two ships so that they function as a smooth, co-operative team! Feel the raw POWER as you lunge for the electro button and BLAST your enemies into expanding clouds of SPACE JUNK!! Feel the humiliation as a carelessly aimed BLAST slams into the side of your last remaining ship!! 8K expansion required.
Available for Commodore 64 **£7.50**
and VIC-20 **£6.**

MATRIX

Jeff Minter has taken Gridrunner – the game that topped bestseller charts in USA and UK – and created an awesome sequel.
Graphically superb, it features multiple screens, new aliens and attack waves, mystery bonuses, renegade humanoids, deflexor fields, diagonal tracking, countdown/panic phase and much, much more . . .
Packed into 20 mind-zapping zones and accompanied by incredible sonics.
8K expansion required.
Available for Commodore 64 **£7.50**
and VIC-20 **£6.**

HOVER BOVVER

A totally original arcade game for C64 featuring outstanding graphics and a sound track created by a professional Piano Wizard. Gordon Bennet has borrowed his neighbour's Air-Mo lawnmower. Mow your way through as many of the 16 lawns as you can before the pursuing neighbour retrieves his mower. Set your dog onto the neighbour to help you out of tight spots and don't annoy the gardener. Try not to plough through the neat flower beds or overheat your mower! **£7.50**

ATTACK of the MUTANT CAMELS

Planet earth needs you! Hostile aliens have used genetic engineering to mutate camels from normally harmless beasts into 90 foot high, neutronium shielded, laser-spitting death camels!! Can you fly your tiny, manoeuvrable fighter over the mountainous landscape to weaken and destroy the camels before they invade the humans stronghold! You must withstand withering laser fire and alien UFOs. Game action stretches over 10 screen lengths and features superb scrolling, scanner 1/2 player actions and unbelievable animation! Play this game and you'll never be able to visit a zoo again without getting an itchy trigger finger! Awesome m/c action!
Available for
Commodore 64 **£7.50.**

REVENGE OF THE MUTANT CAMELS

At last the long awaited sequel to Attack of the Mutant Camels is available. You are controlling a ninety foot high, neutronium shielded, lazer spitting death camel; leading a rebellion against your evil Zzyaxian overlords. The game features beautiful smooth scrolling graphics and no less than 42 different attack waves, more than any game in video history. The challenge of play will last for months as you battle to see what's on the next wave. **£7.50**

GRIDRUNNER

Finally true arcade quality on the unexpanded VIC! Shoot down the segmented DROIDS invading the grid. Beware of the pods and zappers! The awesome speed, sound, and graphics gives you the best blast available for unexpanded VIC.
Available for VIC-20 **£5.00**
Commodore 64 **£5.00**
Atari 400/800 **£7.50**

All orders add
50p postage and packing

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AWESOME GAMES SOFTWARE

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FROM BEYOND THE DARKEST INFINITY OF HYPER-SPACE COMES ONE NAME WE CHALLENGE YOU TO BEAT...
ROMIK
ZAP!

Games we challenge you to beat...on the 64, Vic 20, Spectrum, ZX81, BBC, Electron, Dragon, Oric, Lynx and Atari. See your local dealer for details.

Ask your dealer about these exciting new **Galactic Series 2000** 2nd Generation games.

20 COMMODORE 64 HOME COMPUTERS TO BE WON

ALTERNATIVE PRIZES OF DISK DRIVES OR PRINTERS FOR WINNERS WHO ALREADY OWN CBM64's

PLUS 100 RUNNER UP PRIZES

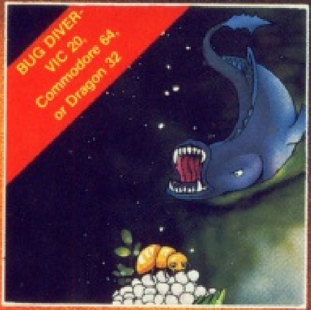
VIC20/CBM64 OR DRAGON JOYSTICKS

Galactic Software are giving away all these prizes to the lucky number winners, anyone who buys a Galactic Series 2000 game before Christmas could win!
For YOUR chance to win a prize simply fill in the entry form with your guess at one of the lucky numbers and send to us with the bottom right corner of the cassette cover of any Galactic game OR send your entry together with your order for any game.
Our computer has chosen 120 random numbers between 1 and 10,000, one for each prize. The closest guess to each number wins the prize.
Closes Dec.24th 1983. A list of all the winners will be available.

In the future... in a galaxy far, far away a second generation of games was created. They were time warped back to our dimension for you to experience, NOW.
The Galactic Series 2000 is here at last.. **Games for the VIC 20, Commodore 64 and Dragon 32.**
All series 2000 games are only £5.50 each.
Money back guarantee.
Unexp. VIC20 games - Keyboard or Joystick.
Commodore 64 games - Joystick control.
Dragon 32 games - Keyboard control.

Dealership enquiries contact 04605 5161
Galactic Software, Unit 7, Larchfield Estate, Dowlish Ford, Ilminster, Somerset. TA19 0PF. Tel:(04605) 5161.

Bug Diver: In this fast paced addictive arcade game, as a mere beetle you've gotta be fast to outswim the merciless bug eating fish while stealing their precious eggs.



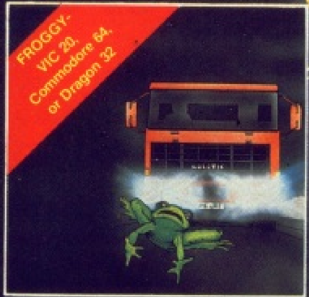
NEW RELEASES!

THE PROGRAM THAT EVERYONE IS TALKING ABOUT

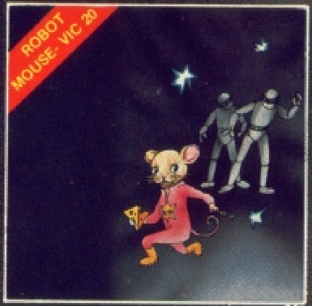
GAMES DESIGNERS

VIC 20	COMMODORE 64
£9.50	£11.50

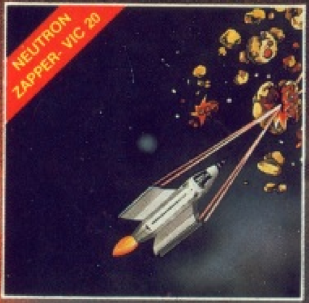
THESE FANTASTIC PROGRAMS ALLOW USERS TO EASILY DESIGN & MAKE THEIR OWN MACHINE CODE GAMES - USING FULL COLOUR & SOUND EFFECTS



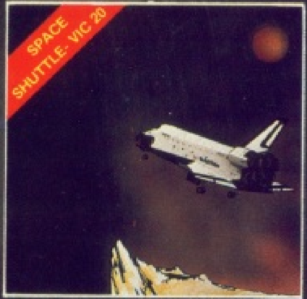
Froggy: Incredible animation in this high performance graphics experience. Frogs, trucks, cars, boats, logs, turtles and lilyponds all combined to give your brain a real workout.



Robot Mouse: In this futuristic arcade game you collect atomic cheese from the floor of the space maze avoiding the mean malfunctioning robots who will on contact.



Neutron Zapper: You pilot one of the best space ships ever built, but that's no protection in this galaxy. Your survival depends totally on the speed of your reflexes.



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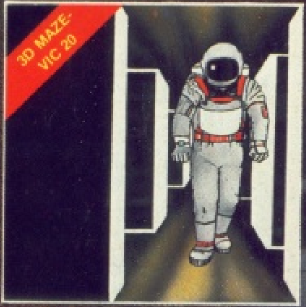

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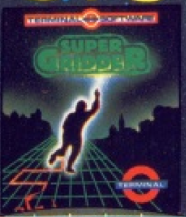
TERMINAL SOFTWARE
SUPER GRIDDER
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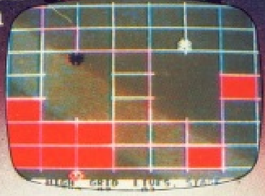
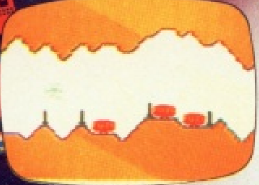


SUPER SKRAMBLE!
Personal Computer News (15-21 Sept '83) gave SUPER SKRAMBLE! an overall rating of NINETEEN OUT OF TWENTY and described it as: "Well implemented with beautifully smooth scrolling and very nice graphics."

SUPER GRIDDER
". . . a compelling piece of frivolity that could give hours of fun." was the verdict of Personal Computer News (22-28 Sept '83).

TERMINAL SOFTWARE
SUPER SKRAMBLE!



TERMINAL SOFTWARE
SUPER DOGFIGHT
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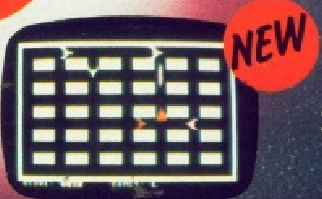
SUPER SKRAMBLE!
"An excellent game" said Computer & Video Games magazine (Sept '83).

SUPER DOGFIGHT
The first 64 games cassette to have SIMULTANEOUS TWO-PLAYER ACTION – realistic sound effects too.



STELLAR DODGER
A game of skill and anticipation in which you must dodge your way through asteroids to complete your mission.

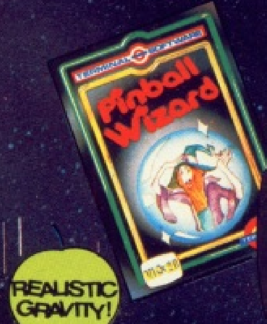
HUNTER
A fast action game in which your pursuers gain in speed and intelligence as you master each successive screen.

VIC-20 games cassettes

Pinball Wizard
Skramble!
Gridder
Line Up 4/Reversi

Get Lost!
Meteor Blaster
Terminal Invaders
Log Run

The Curse of the Werewolf
Rescue from Castle Dread
Magic Mirror
Nosferatu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Pinball Wizard
VIC-20
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PINBALL WIZARD Experience FAST action and REALISTIC gravity as never before. You can even use the flippers to trap and hold the ball. NUDGE the table too – but not too much or it tilts!

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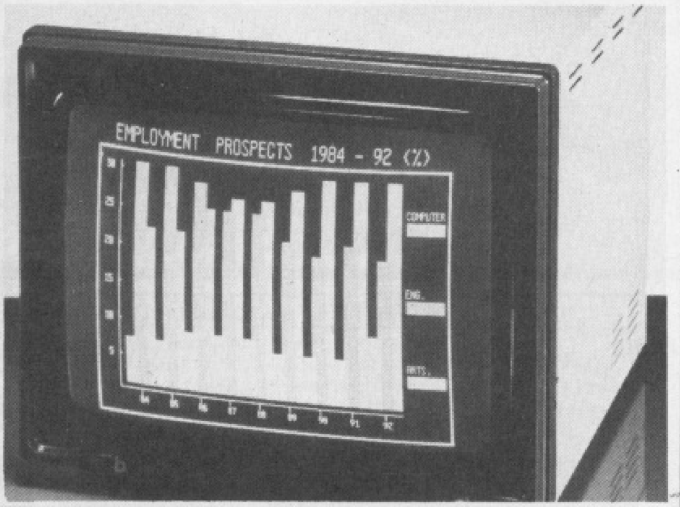
Home micro monitors

Microvitec have made its Cub range of colour monitors available for use on the home micro.

These are 14 and 20 inch screens and are the only colour monitors to be approved under the government's "micro's in schools" programme.

These screens have four times as many dots as ordinary colour television tubes and is thus capable of reproducing pictures in much finer detail.

Both of these monitors will accept signals straight from the micro without the signals having to be encoded by the computer and then decoded using the normal television circuitry. Microvitec Limited are at Futures Way, Bolling Road, Bradford, West Yorkshire BD4 7TU, telephone 0274 390011.



New speech synthesiser from AndOr

The Commtalk speech unit is a versatile synthesizer in that it is compatible with the VIC, 64 and PET.

This is the first product of a recently formed company called AndOr Systems who are looking for dealers to support their products.

The basis for the speech synthesizer is the use of allophones which are sounds used to construct words. Using this principle, Commtalk has an unlimited vocabulary.

Speech can be accessed directly through BASIC commands and a library of words can be built up in strings. It is also possible for Commtalk to talk whilst a programme is being executed.

Amongst the many applications of speech units is Computer Aided Learning, applications in industrial control and games. The speech comes from a television or monitor in the case of the VIC and 64. The PET can have either a separate speaker or the PET unit can double up as a sound box.

The cost of the unit for the PET is £45 whilst the unit for the vIC and 64 costs £39. Each unit carries a six month guarantee and can be obtained from AndOr Systems, 28 Hillside Drive, Rathfarnham, Dublin 14, Ireland.

Dual program cassettes

An expansion board for the 64 that features four expansion slots has been developed by a company called Compuscope. This expansion board means that owners of the 64 can add a wide variety of software and expansion peripherals.

Three of the expansion slots are vertical providing easy access to standard size cartridges whilst the horizontal port permits the use of larger cards like an 80 column video converter as well as normal expansion cartridges.

One of the integrated circuits on the board gives the 64 Expander a pause feature which enables the user to halt the operation of the computer at the push of a finger.

Another helpful feature of the board is the restart function which leaves memory location intact and allows machine code programmes to be reactivated directly which should be helpful when new software is being debugged.

This does not apply to BASIC programmes which can only be recovered with the help of additional software provided by Compuscope who can be contacted at 6400 Signal Street, Tillamook, Oregon 97141, USA.

Compuscope launch expansion board

Audiogenic are claiming to be the first software house in the UK to produce dual program cassettes.

Both sides of the cassette have the same program recorded on them although one side is for the VIC and the other side is for the 64. No doubt this claim will be hotly disputed!

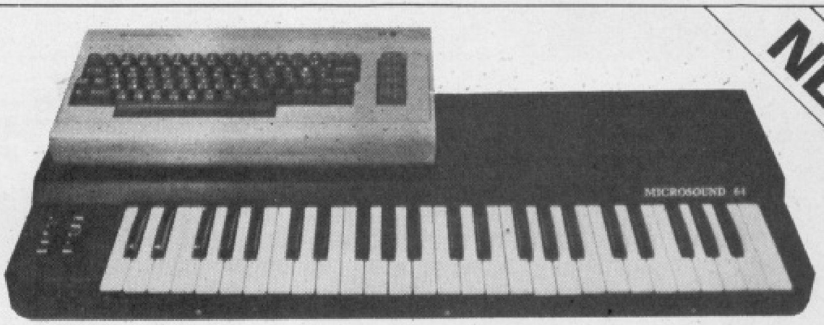
The games concerned in this 'innovative' launch are Cataclysm and Bonzo. Cataclysm is an arcades game which can be used on unexpanded machines. The player takes the part of the commander of a laser whose mission is to destroy as many Jovian saucers as possible. The cost of destroying thse aliens is £5.95.

Bonzo puts the user in the role of a collector of boxes which the user has to get by climbing ladders all over the screen and avoiding all the monsters. This game costs £7.95.

One game which Audiogenic have not yet put on a dual machine cassette is a game called Shifty for the VIC with 8K expansion. Here, the player is trapped in a maze inhabited by ghosts and food pills. The player must avoid being caught by the ghosts. This particular game will cost the user £5.95.

All of these games can be obtained from Audiogenic Limited, PO Box 88, Reading, Berkshire RG1 2SN, telephone 0734 595647.

NOW HEAR THIS!



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LEVEL 9 ADVENTURES

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BBC 32K COMMODORE 64 SPECTRUM 48K
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These games are very much bigger than normal adventures yet cost £9.90 each. The number after each name is an estimate of how many weeks an average player may take to solve the game – for your information.

1. COLOSSAL ADVENTURE (4 weeks)
The classic mainframe game "Adventure", with all the original puzzles plus 70 extra rooms.

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An epic puzzle journey through Middle Earth.

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Over 100 puzzles to solve and 40 treasures to find.

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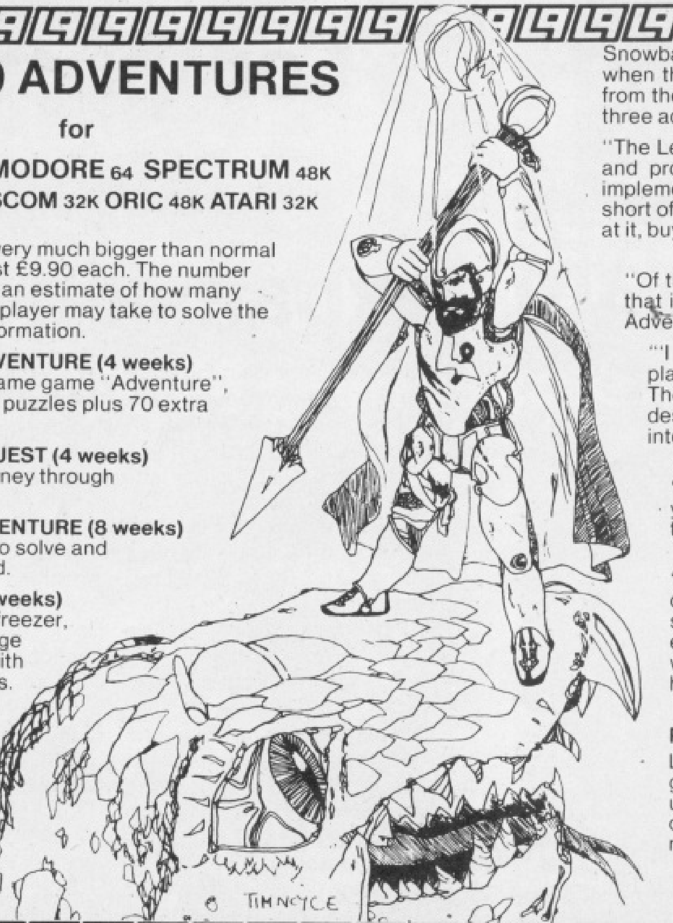
Save the interstar freezer, Snowball 9, in a huge space adventure with over 7000 locations.

Note: a lot of players take much longer than the times above. Don't be discouraged if you are one of them!



Snowball was too new to have been reviewed when this ad. was placed, but here is a sample from the superb independent reviews of our first three adventures:

"The Level 9 Adventures are superbly designed and programmed, the contents first rate. The implementation of Colossal Cave is nothing short of brilliant; rush out and buy it. While you're at it, buy their others too. Simply smashing!"
–SOFT, September 83

"Of the programs reviewed here, the only one that is wholly admirable is Level 9's Colossal Adventure." *– Your Computer, September 83*

"I found Dungeon exceedingly well planned and written, with a fast response. There are well over 200 locations and the description are both lengthy and interesting."
– Computer & Video Games, September 83

"This has to be the bargain of the year . . . If adventures are your game then this is your adventure."
Home Computing Weekly, 30th August 83

"There are three excellent adventures on offer from Level 9 . . . the descriptions are so good that few players could fail to be ensnared by the realism of the mythical worlds where they are the hero or heroine . . . great fun to play.
– Which Micro?, August 83

Price: £9.90 each inclusive

Level 9 adventures are available from good computer shops, or mail-order from us at no extra charge. Please send order, or SAE for catalogue, describing your micro, to:

LEVEL 9 COMPUTING
Dept I, 229 Hughenden Road
High Wycombe, Bucks HP13 5PG

A speedier PET with a bigger memory

An add on board for the PET has been designed to increase the speed of the PET and the sixe of the memory.

For users of the 3000, 4000 and 8000 series machines, the PETX2 system comprises of one board which fits inside the computer providing 96K of memory and upgrading other systems.

The microprocessor chip behind all this is still the 6502A and the system provides the opportunity to switch between different memory banks and VDU and input/output peeking routines.

The manufacturers of the board, J R and S Purdue, claim that the board gives twice the speed and three times the memory of the standard PET system for £350 excluding VAT.

J R and S Purdue are at 1 Port Hill, Hertford, Hertfordshire SG14 1PJ telephone 0992 57393.

Reducing printer noise

There is a new printer cover from Industrial and Marine Accoustics which should reduce printer noise to below 50 decibels.

The IAMA IH 101 Printer Cover is designed for 80 column printers and is made of white moulded plastic with a perspex window. The interior of the cover is lined with foam and there are two versions available, one with a cooling fan.

The cost of the model without the fan is £158 and with the fan included the price is £184.

An optional extra is a metal stand which will cost a further £48. All of these products are available from Industrial and Marine Acoustics, PO Box 8, Cheadle, Stoke on Trent, ST10 4LH.

More Basic commands

Softchip is now available for the Commodore 64 and, if its popularity with the PET is anything to go by, it should be a serious rival to Commodore's own Simons BASIC.

Softchip is a programmers aid which comes as a plug in 8K cartridge that fits on to the back of the 64. The major selling point of this utility is the fact that the actual choice of commands that the cartridge contains is entirely user selectable.

Each cartridge is capable of holding about 7100 bytes worth of commands although the choice can be made from commands totalling over 20,000 bytes. The cost of this programmers aid is £34.95 and this includes a free demonstration cassette featuring all the Softchip commands.

The manufacturers of this product are Whitby Computers who can be contacted at 8 Chub Hill Road, Whitby, North Yorkshire YO21 1JU. Telephone: 0947 604966.

Commodore – new computers

Two new Commodore home computers, based around a new microprocessor chip – the 7501, were revealed for the first time at the Consumer Electronics Show held at Las Vegas in January. Software for the new machines will not be compatible with that for the Vic-20 or the Commodore 64, but Commodore says that the new models are intended to complement the existing range and not to replace the 64.

Called the Commodore 264 and the V364, these models look completely different to the Commodore machines currently on the market. They are slimmer in appearance and have a different keyboard. In fact their appearance is reticent of Japanese-made home computers.

Commodore has scheduled an April launch date for the American market.

As the name suggests, both models use 64K of RAM and their capabilities slot in either side of the Commodore 64, as does the price of each machine.

The Commodore 264 has 32K ROM and 64K RAM of which 60K is addressable in BASIC. It has a more restricted array of graphics than the 64. Maximum screen resolution is 320 – 200 pixels. The 264 also has a more restricted version of SID with two instead of three voices. Its two sound generators each have eight volume levels, programmable as either two music channels on one music and one white noise channel. The full size, 67-key keyboard includes four pre-programmable function keys. When used together with the Shift key, this gives up to eight user-defined keys.

A full upper and lower-case character set is provided by the software in the 264 ROM which also offers a built-in machine code monitor and 'window' graphics capability. Other available software includes spreadsheet, word-processing, file-handling and graphics, either as a built-in option or as a range of plug-in cartridges.

The Commodore 364 is very similar to the 264. It includes a built-in speech synthesizer with a vocabulary of over 250 words, which accounts for its increased ROM size of 48K. Additional vocabulary can be soft-loaded from disk or cartridge.

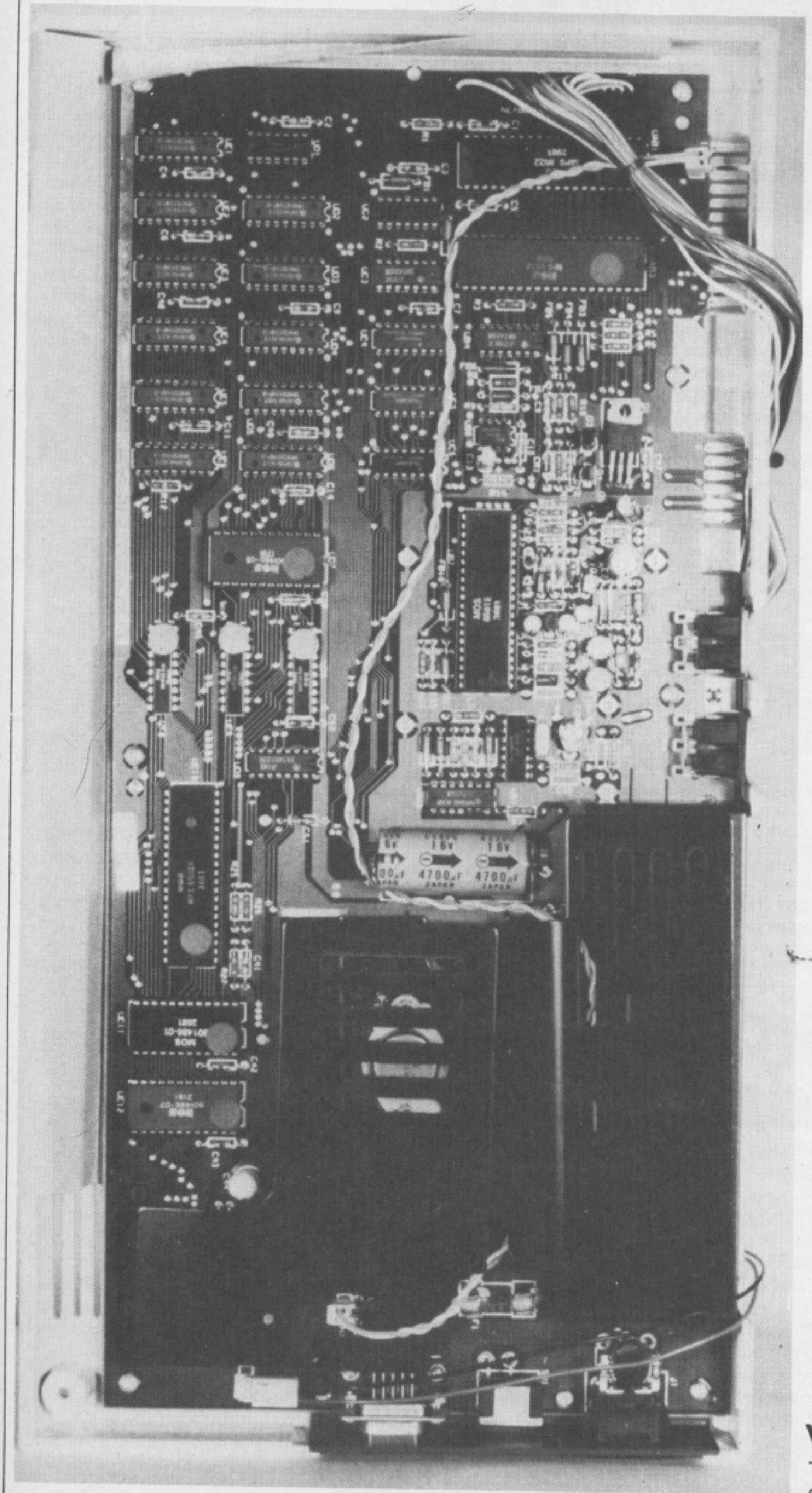
The 86-key keyboard of the V364 inlcudes a 19-key numeric pad.

Our future

Whenever possible we at Commodore Computing International try to make improvements to the magazine, often at the suggestion of readers and advertisers. You may have noticed some of the changes we have introduced recently – many of you will certainly have noticed that something odd has happened to our publishing schedule.

The reason why the December issue was followed after a long gap by this, the February issue, is that we are gradually bringing forward the publishing date of Commodore Computing International to the middle of every month. To achieve this we could have published two issues in one month but this would have been inconvenient for our advertisers and many of our readers. Instead we have left a longer gap than usual between two issues and intend to change our publishing schedules gradually.

We must admit that pre-Christmas production problems influenced the timing of our plans but hope you will bear with us for the next couple of months while we adapt.



Ever wondered what the inside of your computer really looks like but never had the courage to peak inside? The fact that taking the lid of the micro can invalidate the warranty puts many people off so we decided to put your minds at rest by showing the inside of the machine. This month we look at the VIC-20 and next month we will be taking a more detailed look at the 64.

It might not look like it but the inside of any computer is mainly wires and switches. There are almost too many wires and switches to count – and they are too small to do so with naked eye.

Elementary computer lessons begin with explanations about switches that are either on or off – saying yes or no, or, in binary code 0 or 1. These are contained within the chips.

The wires, of course, look nothing like wires. On the printed circuit board (PCB or motherboard) that forms the basis of the computer they are 'painted' onto the surface. Inside the chip the pathways that form the wires are etched into the silicon.

The numbers on the black and white photograph correspond to the numbers below. We give a brief explanation of the function of each item. It would be impossible, of course, to describe every part of the computer but this should give you a rough idea of how it's laid out and how it works.

6502A microprocessor

This eight bit chip, manufactured by MOS Technology, is the Central Processing Unit (CPU) at the heart of the VIC. It is this chip which performs all the instructions when a program is RUN. It is called and eight bit processor because during each instruction or operating cycle eight bits of data are operated on or transferred simultaneously.

The inside of a computer but it can easily be divided into two sections – the control section and the register section. The control section recognises the instruction and initiates the correct sequence of data transfers and the register section actually carries out the processing.

Voltage regulation circuitry

This controls the power supply for all the chips.

BASIC ROM

Even novices will know that ROM stands for Read Only Memory – memory which cannot be changed by the user. BASIC ROM reads all the commands in BASIC and enables the computer to act on them. The BASIC ROM chips actually use programs written in machine code! Without BASIC ROM the computer would be unable to act on the BASIC commands.

Kernal ROM

This chip contains the routines which control the input and output of the computer.

Buses

These are simply the pathways along which signals travel. Inside the micro there are usually three buses – control bus, address bus and data bus.

The control bus is the route along which timing and control signals travel. The address bus carries information about that part of the memory with which the 6502A microprocessor is dealing. The data bus carries data back and forth between the CPU and the memory.

6561 Video Interface Chip

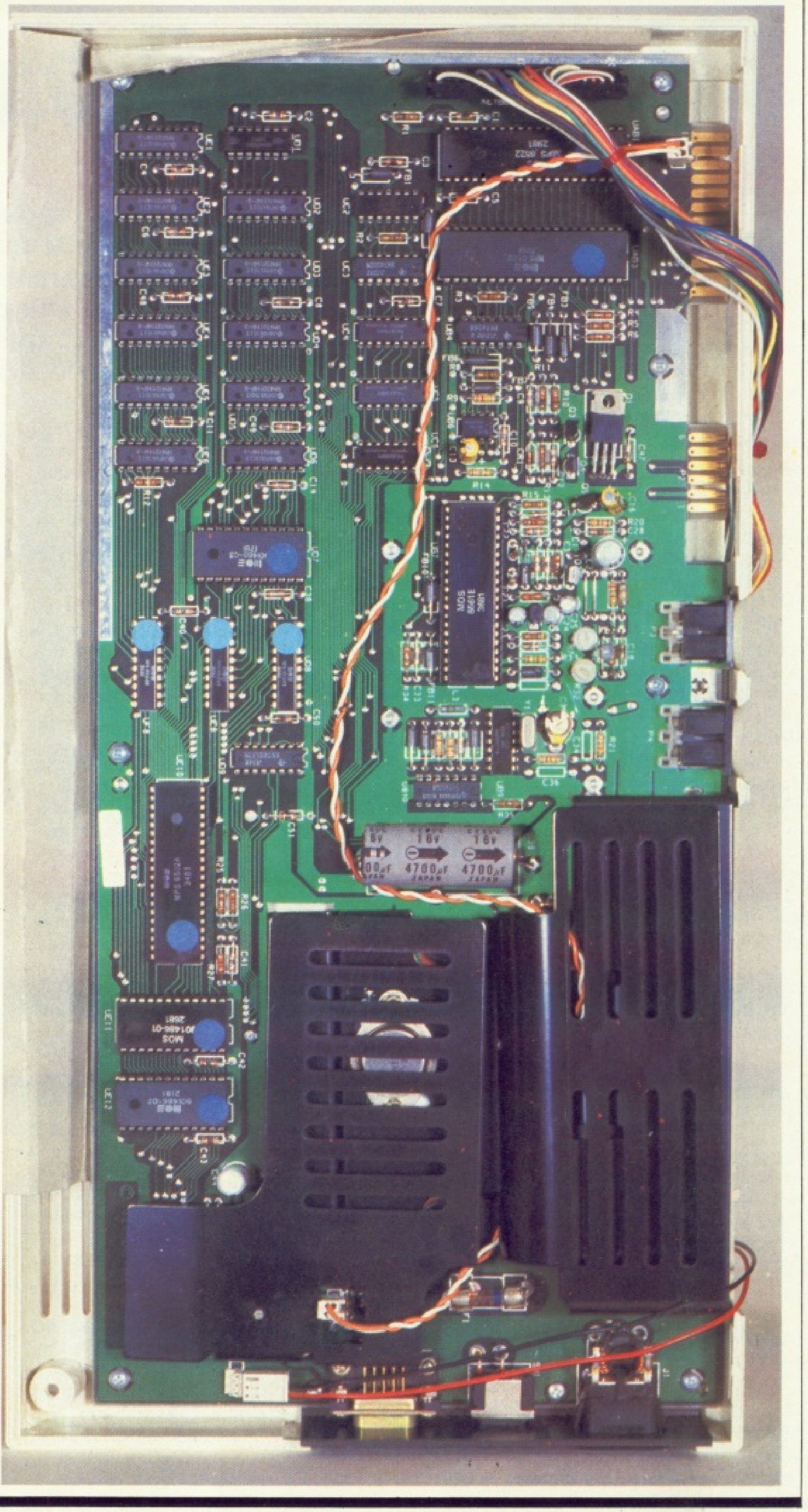
The VIC chip (now you know where the name comes from!) controls not only the connection between the computer and the screen but also the sound functions of the VIC. It can also take the input from light pens and joy sticks. The only function of the VIC chip which is not under the direct control of the user is the oscillator clock.

RAM chips

Just as every novice knows what ROM means, so every novice learns quickly that RAM means Random Access Memory. This is, of course, the memory that's accessible to the user. There are ten RAM chips and there are four areas of RAM used by the 6561 chip. These are the character generator, which is self explanatory; the character pointer, which contains the data about positions on the screen; the colour pointer, which contains data about the foreground and background colours of the screen; and the 6561 control register, which, as the name suggests, controls how the 6561 connects with RAM.

VIA chips

These are the versatile interface adaptors and, as the name suggests they deal with input and output which is not dealt with by the kernal ROM.



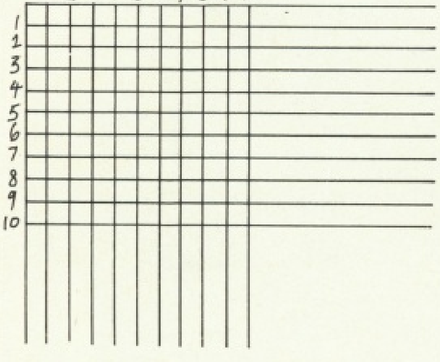
How to build a digitiser

This month our project is something completely different – we are throwing out a challenge to all our readers. We enjoy thinking up ideas and turning them into reality but we felt it was time we let our readers have a go. Our postbag shows that there's a lot of creative talent out there. Here's your chance to prove it to the rest of the world. Who knows? You might even end up with a new career!

The principles behind a digitiser are simple – but could you design one, build it and write the programs that enable it to work? If you can, we would like to see the results and will publish the best. We will, of course, pay for publication. But please do not send us the completed digitiser. We will first of all be satisfied with the design.

As with most exercises of this kind simplicity is important. The digitiser should be as simple as possible to build, easy to operate and the less complex the programming the better. Accuracy is important, too, and the digitiser should be as accurate as the computer allows. We have not put a limit on the cost but out of two similar digitisers we would choose the cheapest. Neither have we put a limit on size and weight but we will apply the same criteria and choose the most compact digitiser. To help you in your task we discuss the principles behind a digitiser, its function and some ideas.

A digitiser is a gadget which, at its simplest, enables you to feed information into the computer. The computer then converts the information into coordinates which work in a similar way to map coordinates. With plotters the computer tells the pen where it should be by giving the plotter coordinates – a plotter is rather like a digitiser in reverse.



The best place to start is probably with a sheet of graph paper, numbered along the top and bottom from 1 to 255. This will at least give you an idea of the concept.

The computer needs to convert any signals it receives into two numbers which will serve the same purpose as map coordinates. But the signals that the computer receives will depend on the method you choose for your digitiser. Whichever construction you choose for your digitiser it will need to give two signals to the computer.

Unfortunately you already come across a problem (we would rather call it a challenge). How accurate can you be? It is possible to design mechanical equipment which is more accurate than the computer – certainly as far as displaying the coordinates on the screen is concerned. We have given a lot of thought to this and have a few ideas of our own but we would rather see your ideas first.

The resolution of the Commodore 64 is 320 by 200 so if your digitiser is capable of a resolution of 255 by 255 – in other words capable of plotting 255 points vertically and 255 points horizontally – you will need to take steps to ensure that there is no confusion about exact position of the digitiser's pointer.

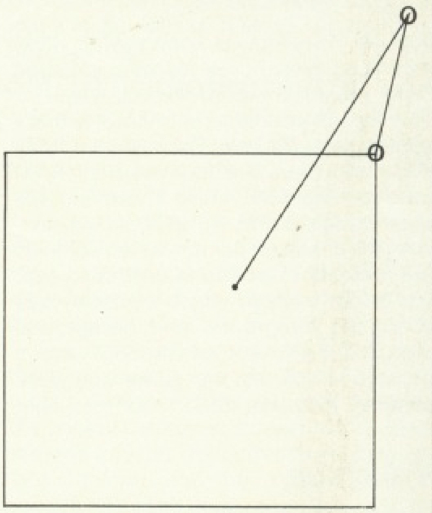
This is the next challenge: to find a way of feeding information about the position of the pointer into the computer. The first idea that springs to mind is to use a potentiometer. This produces an electrical signal which varies according to the position of the pointer.

You will now come across another problem – what sort of signal will the digitiser send to the computer? According to the method used the signal will either be analogue or digital. The computer can, of course, only understand digital signals so if your digitiser is sending out analogue signals you will need to work out some way of converting them to digital signals. This is easy with analogue to digital (A-D) converters.

According to the circuit diagram for the Commodore 64 there are two A-D converters inside the computer. Can these be utilised in any way? Remember that there are two signals to be converted. If they are converted outside the computer this can create its own problems. The user port can only easily accommodate one A-D converter although we feel that with a bit of extra circuitry and ingenuity two, or even four, could be accommodated.

Remember to take care here, however, since you could find yourself overloading the computer and a separate power supply might be necessary.

The mechanical construction of the digitiser looks like a problem for someone with a bias towards engineering. One of the simplest approaches might be to

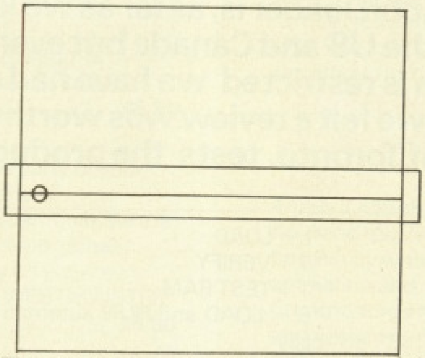


The arm approach to the construction of the digitiser – remember that the lengths of the two sections of the arm are very important.

-let's have your ideas

design a board with an arm in one corner. The arm would be jointed and the potentiometers would be located at the corner, where the arm joins the board, and at the joint in the arm. These potentiometers would send information to the computer about the angles at the corner and the joint in the arm.

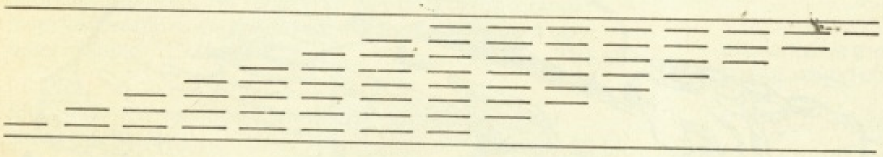
Another soution is to design a digitiser with a slider that moves up and down the board and a pointer that moves from left to right along the slider. A potentiometer wheel attached to the slider would provide information about the coordinates of the pointer along a vertical axis while a wheel which was connected to the pointer itself would provide information about its position along the horizontal axis.



The slider approach to the construction of the digitiser – the slider moves up and down and the pointer moves from left to right.

It might also be possible to use light to provide a signal for the computer. It should be possible, for example, to fix up some sort of arrangement using LED's (light emitting diodes) and photosensitive cells.

You would need a better system than that currently employed on some touch sensitive computer screens. If you wanted to be able to plot 255 positions along the vertical and 255 positions along the horizontal you would need 255 LED's and 255 photo diodes. The touch sensitive screens work in just such a way – interrupting the light beams tells the computer exactly where you are pointing.



The punch tape approach – there are 256 possible combinations of eight holes, corresponding, of course, to eight bits.

An arrangement of LED's and photosentive cells for a digitiser could be much simpler. Eight LED's could corresond to eight bits of a byte and two sets of LED's could give the computer all the necessary information about horizontal and vertical coordinates. An LED arrangement would have considerable advantages. Relatively few moving parts, for example, and it is possible to find enough combinations of eight lights to give a unique combination for every number between 0 and 255. If we say too much more about LED's and the sort of signals they can give the computer we feel we may be making the task a little too easy!

One more point about LED's. Consider the advantages and disadvantages of using straightforward binary numbers and a grey scale.

A look at how some other computer peripherals work might spark off a few ideas. Light pens use principles which should, by now, be familiar. A picture is produced on a screen by a beam that scans across the screen and which causes it to glow. Most micros are now built with internal resisters which will tell it exactly which part of the screen is being scanned. As the pulse enters the light pen the computer therefore knows exactly where the light pen is positioned.

There is one other idea which we feel may well prove to be impracticable but which someone may put to good use. We have been toying with the idea of using pressure sensitivity to indicate the position of a pointer. Two sheets coated with some sort of conducting material with uniform resistance would provide the necessary information. It would also pose problems. How would you ensure that the pressure was applied to a small enough area? Using lines of conductive coating might be one way out but this wculd create even more problems. We'll leave you to figure out what they are and find a way around them if you think it is a viable proposition.

You will not need to be a professional programmer to write the programs which will enable the computer to receive and make sense of the information from the digitiser but we will be looking for the most efficient routines. That makes it sounds if we are looking for machine codes but we will be just as happy with BASIC. The ideas behind the programs are more important than the programs themselves. There is one proviso, however, the programs must work!

High resolution graphics will be essential. We would be grateful if you would use the hi-res routines published in the October issue of Commodore Computing International, BC Basic, Simons Basic, Screen Graphics or Ultrabasic.

One of the most important aspects of a digitiser that must be borne in mind all the time is how it will be used. After all, it might be fun to design a digitiser and to write the programs that enable it to work but all you have done so far is to design a machine that will produce a drawing on the screen. What do you do with it now?

It would be useful, for example, if areas could be calculated. This would be the sort of thing that an architect would be looking for when buying a digitiser.

We would like a print out of your results if you possess a printer but do not let the lack of a printer put you off. We would still be interested in looking at your ideas.

We will need all entries in our office by the last day of February 1984 – not a great deal of time but we will need time to assess the ideas. We expect to be publishing the first digitiser in our April issue. Remember, all we need are the design plans, a description of the principles behind the design, the programs required, which hi-res routine you have used, details of any interfacing or other circuitry you have used, details of any interfacing or other circuitry required and, probably most important of all, a brief summary of everything you have done.

Two final words: Good Luck!

Accelerate your micro

The VIC Rabbit loader is, as far as we know, only available in the US and Canada but even though its distribution is restricted we have had such good reports that we felt a review was worthwhile. Brian Hillis, of Toronto, tests the product for us.

Probably one of the most useful add-ons that you can buy for the VIC-20 or CBM-64 is a handy little board called a Rabbit, from Eastern House Software, in the US. This is assuming, of course, that you are among the vast majority that use cassettes rather than a disk drive for storing programs.

One of the greatest problems with storing data on tape is the amount of time that it takes to either SAVE, VERIFY or LOAD programs. This is in part due to the fact that the conventional SAVE command actually saves the program twice, comparing both saves to the original in memory. Similarly, the LOAD command causes the computer to load the first copy of the program and then compare it with the second copy to ensure that everything works fine. Otherwise, the dreaded "LOAD ERROR."

Now, if you are the sort that looks forward to these long LOAD or SAVE breaks from the video terminal, then definitely do not buy the Rabbit. However, if, as I suspect, you would like to get things done quickly and efficiently in order to get on to other more important things, then this is the add-on for you.

The Rabbit is a circuit board that plugs into the expansion port of the VIC or 64. It has two ROM sockets, one of which is empty and slated for future expansion. The other contains a ROM that will add about a dozen new commands to your computer. At the back of the circuit board is a 44 pin female socket. The idea is that the Rabbit connects between the VIC (or 64) and any other expansion board; and once you plug it in, you never have to take it out, for any reason.

In order to activate the Rabbit, you only have to type SYS 7*4096 (SYS 28672 works as well). Having done this, the screen displays a copyright message, and the signal that everything is READY to go. The new commands at your disposal are as follows:

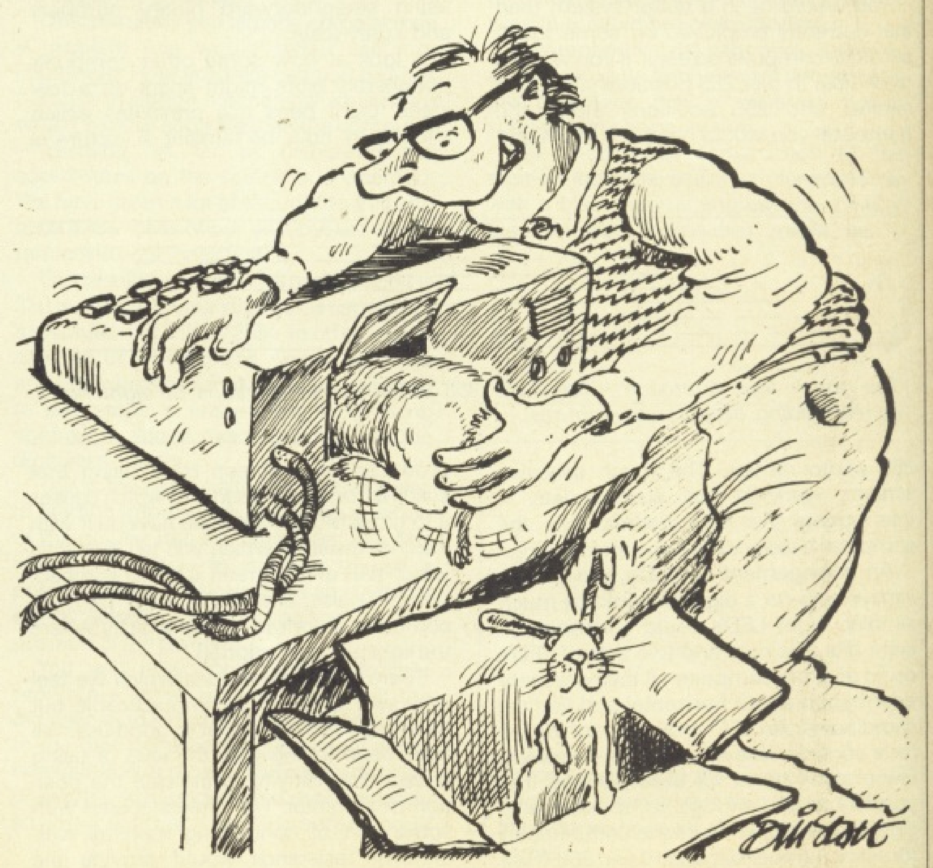
*S = SAVE with 6 second leader
*SS = SAVE with 3 second leader
*L = LOAD
*V = VERIFY
*T = TEST RAM
*E = LOAD and RUN automatically
*H = Converts HEX number to DEC
*D = Converts DEC number to HEX
*G = GOTOL ML program
*Z = Toggles graphics to u/l case
* = Convert from monitor to reg
*K = KILL the Rabbit

If you use the Rabbit for no other reason than to LOAD and SAVE programs, then you have made an extremely wise investment. Being able to use any of the other features is strictly a bonus.

Using the conventional method of saving a 16K program to tape, takes just over five minutes. Using the *S method takes less than a minute, and even three seconds less if you use the *SS command. The extra three seconds allows for the leader at the beginning of a new tape.

As with the normal SAVE command, you can use the Rabbit commands to SAVE with the RAM addresses needed for reloading machine language programs to the proper place.

LOADING and VERIFYING both work



Mr. Chip

SOFTWARE

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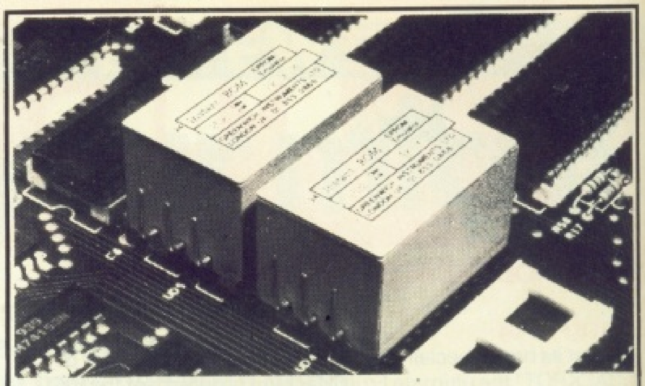

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the same way at the same speed. Unfortunately, however, the Rabbit will not load programs that have been saved in the conventional manner. This increase in speed almost makes you look forward to saving your programs more often as you are working on them.

The three main commands *S, *L and *V can all be used without program names and will perform the requested function on the next available program on the tape.

The manufacturer suggests the following procedure for locating the end of the last program on a tape:

1 With the program that you wish to SAVE stored in memory, load a tape in the datasette.

2 Type *V "Program Name" RETURN, where "Program Name" is the last program on the tape.

3 When the tape reaches the end of that program, the screen will display VERIFY ERROR. (Naturally, since the program in memory is not the same as the program being verified.)

4 You are now at the end of the last program and can SAVE (*S) the program in memory.

Unfortunately, this does not always work properly. Several times this procedure damaged the program in memory. Fortunately, there was a good back-up copy (as, of course, there always should be) and the problem was not too serious. If you are very anxious to "crunch" your programs onto as little tape as possible, you can use the following procedure:

1 SAVE the program in memory to a temporary tape (use *SS, its quick).

2 Now use the recommended VERIFY procedure.

3 ReLOAD the program back into memory.

4 Now SAVE (*SS) it to your good tape.

The Vic Rabbit uses memory from 28678 to 32767. If you are using an expansion board, be sure to put the Rabbit board between the computer and the expansion board. This allows the Rabbit to isolate the memory that it uses in Block 3. The other alternative, of course, is to type *K (to kill the Rabbit). Typing SYS 7*4096 will reactivate it.

The instruction book that comes with the Rabbit is a bit sparse, but it does provide enough information to make the investment worthwhile. As mentioned earlier, the SAVE, LOAD and VERIFY options are very likely the main, if not the only, ones that you will use.

This reviewer used the Vic Rabbit for about six months, and after only a couple of days, could not imagine getting alongwithout one. Unfortunately, when I got rid of my Vic for a C64, I was unable to get the 64 Rabbit. Not being content to go back to the old slow system, I invested in a 1541 disk drive. Granted, the drive is much more versatile than the datasette, but with a Rabbit loader, it's not really that much quicker. And the difference in price!

Music education

As even the most inexperienced student of music knows Every Good Boy Deserves Favour. And every good educational program that teaches music deserves the favour of a good review.

Unfortunately it is difficult to give any educational program an unqualified 10 out of 10. Some games masquerade as educational software to make you feel less guilty about playing them and have little educational value. Others appear to be written by people who have enjoyed the challenge of writing the program and the educational value has suffered as a result.

Chalksoft have published some excellent educational software and it's in comparison with the rest of their output that Note Invaders fails to satisfy.

The main criticism of Note Invaders (£9.25) is that it does not seem to be a program aimed at promoting a real understanding of music. Instead it teaches by rote. It can be used on the VIC-20 using 3K, 8K or 16K expansion.

The first side of this cassette is more of a game than an educational device although the idea of combining the two is a good one because it attempts to make learning fun rather than a ritualistic chore. It is not dissimilar to a game like Space Invaders because the idea is that on the musical stave which appears on the screen several notes appear and it is the job of the pupil to guess what the note is.

If the answer is correct a laser zaps the note. If the answer is wrong then the player loses a life and is completely destroyed after four incorrect guesses. For each correct guess points are awarded and after a certain stage the stave actually starts getting shorter.

This is a rather mediocre example of a combination of learning by trial and error. In this case, the user has the satisfaction of knowing that the errors, when they occur, are not solely their own fault.

The second side is much more of an educational program although this does have its limits. The user can only learn the names and sound of the notes and not how to construct some sort of musical harmony and this serves to the disadvantage of the whole program. Another disadvantage comes from the fact that the program does not provide a running demonstration of a musical score that has been successfully put together.

The format of the screen is basically the same – the five lines that form the stave – and the notes. Thankfully this time the notes are not space invader clones. There are two separate sections to this part of the program, the first of these being staff 1. This acts as a demonstration program using treble and bass clefs putting questions in the way of the user as the program proceeds.

After reading the introductory notes to this section of the program, loading the second part of this cassette, staff 2 is a bit of a nuisance because it necessitates switching the VIC off and then on again without touching the cassette. This part of the program will actually test the acquired knowledge of the user in a 20 Questions format. But the annoying bit about this is that once a wrong answer is returned, the program goes right back to the beginning of the test including the position of the notes and the name of the notes.

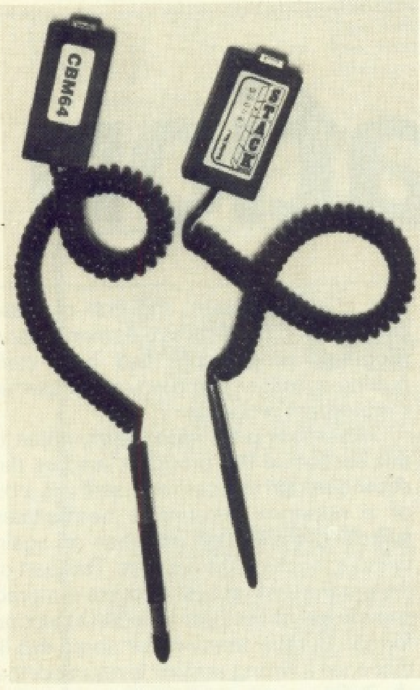
As a program that teaches the absolute beginner the names of the notes Note Invaders is a success. But our feeling is that Chalksoft could have gone a little further towards teaching an understanding of music. Although the beginner may well be able to name every note on the staff it is doubtful whether the way the program is designed would be able to put that knowledge to any good use.

Perhaps Chalksoft feel that such a task should be left to another piece of software. We look forward to seeing it.

A Stack of light pens

There are currently three methods of inputting information to play games. The most common methods used are keyboard or joystick. The third method, probably less widely used, is screen input via light pen. Two new light pens have recently been launched by the Liverpool-based software company, Stack.

One of these light pens is for the VIC 20 the other for the 64 and both of them are complemented by a range of Stack programs.



At one end of the light pen cable is the adaptor which plugs into the user port and at the other looks like a biro except in two very important respects – the 'nib' of the pen is actually the light sensor in the pen casing and there's a touch contact which controls the light sensor.

Any television picture is made up of a series of dots which scan across the television screen leaving the traces of light that forms the picture. The light sensor in the pen picks up the dot as it passes the tip of the pen and a message is flashed across to the VIC or 64 that the dot has been seen by the pen. The spot where the dot was picked up is recorded in the VIC chip and these locations will change as the pen is moved across the screen. The data for each location is stored in two registers, X and Y, for the horizontal and vertical positions.

This does not mean to say that the whole area of the television screen can be used in the case of Stack's lightpen software. The working area is defined by a border and the letters and numbers displayed by the VIC on the screen are made up of 64 points of light called pixels.

However, in the case of light pens, the VIC is not completely accurate in recording the position of the light pen. In the case of the X register the difference is four pixels and in the case of the Y register the difference is two pixels. It is this that accounts for the fact that when the resulting flashing dot appears on the television set upon contact with the light pen it is often not at the exact point of contact between pen and screen. It is this that is a major disadvantage to this form of input. Once this has been mastered by sheer patience and a try try again attitude, the pen performs satisfactorily.

Before the pens can become operative, some programming is essential. The first bit of programming concerns the touch contact and instructs the micro not to see the television picture until the user touches the contact. Without any form of instruction the micro would see the picture without the pen coming into contact with the screen and the result would be uncontrollable flashing dots.

The instructions necessary for this control as well as a simple program to place a square on the screen at will are given by the manufacturers. Once this square has been placed on the screen, it can be moved around the working area at will using the pen. These requirements are the same for the VIC as the 64 except for the difference in programming instructions and addressable locations.

To test the light pens in this review, the game called Cross Word Twister was used. In this case, the screen display was a blank crossword grid in which the player had to make words made up of letters selected at random by the computer. Once the letter appears on the screen, the player must shoot the letter with the square and then trace a path down to the required position in the grid. Once the touch contact has been deactivated, the letter will appear at the required position. Other games that need light pen control are Othello, Seek & Destroy, VIC Simon, Life, Go, Draughts, Concentration and Lost in the Labyrinth. Each light pen comes with a free game on a cassette.

Stickless joystick

The SunCom Joy Sensor is compatible with the VIC 20 and the 64 and is the latest thing in game control technology. This is a product that has been developed in the US and it is being distributed in the UK by Consumer Electronics Limited.

This joystick is unusual in that there is no stick to move and, as a result, none of the wrist ache sometimes associated with normal joysticks.

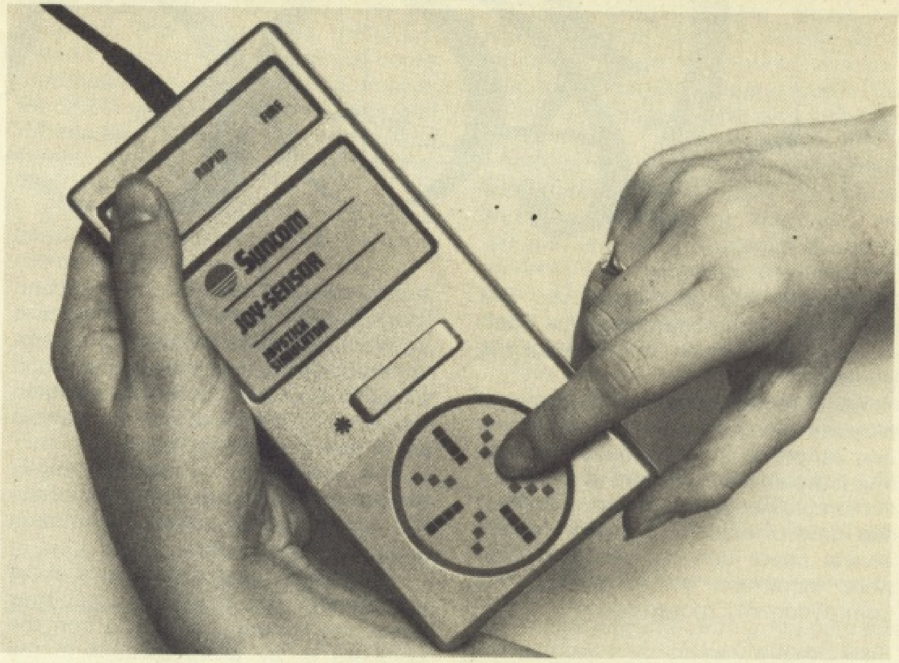
The sensor is also completely different in shape and size to the conventional joystick. For a start it has no control lever protruding from the top. It is flat and oblong in shape with one switch and two touch sensitive panels. Hooking the Joy Sensor up to the micro is simply a matter of plugging into the user port. The connecting cable is much longer than usual.

HARDWARE REVIEWS

At the head of the instrument is a touch pad that controls the firing mechanism. This mechanism has two options, either single fire or rapid fire. Because both the movement control and fire mechanism are controlled by touch pads and not by a control lever this means that any resistance to movement and firing is cut down to an absolute minimum. Controlling the direction of the character or the space ship is performed by two sets of controls towards the bottom of the sensor.

The first of these is an oblong switch that controls the number of directions available. When the cross is visible, the minimum four directions are operational. When the star is visible, the choice of movement is increased to the maximum of eight directions. The other part of the direction control is provided by the circular panel on which the available directions are indicated. For both fire and movement, just the slightest touch is all that is required.

Anybody who is used to using the conventional joystick could, at first, find the touch pads rather disorientating. For the first few days the user is constantly having to look down at the controls to make sure that the right part is being pressed.



This apparent disadvantage is more than compensated for by the durability of the sensor. There is only the one moving part (the switch controlling maximum and minimum movement) and because of the lack of the moving parts the working life of the unit should be a great deal longer than that of other joysticks.

The Joy Sensor is very comfortable to hold, lightweight and easy to use. It is a very good piece of equipment that is worth the recommended retail price of £29.95.

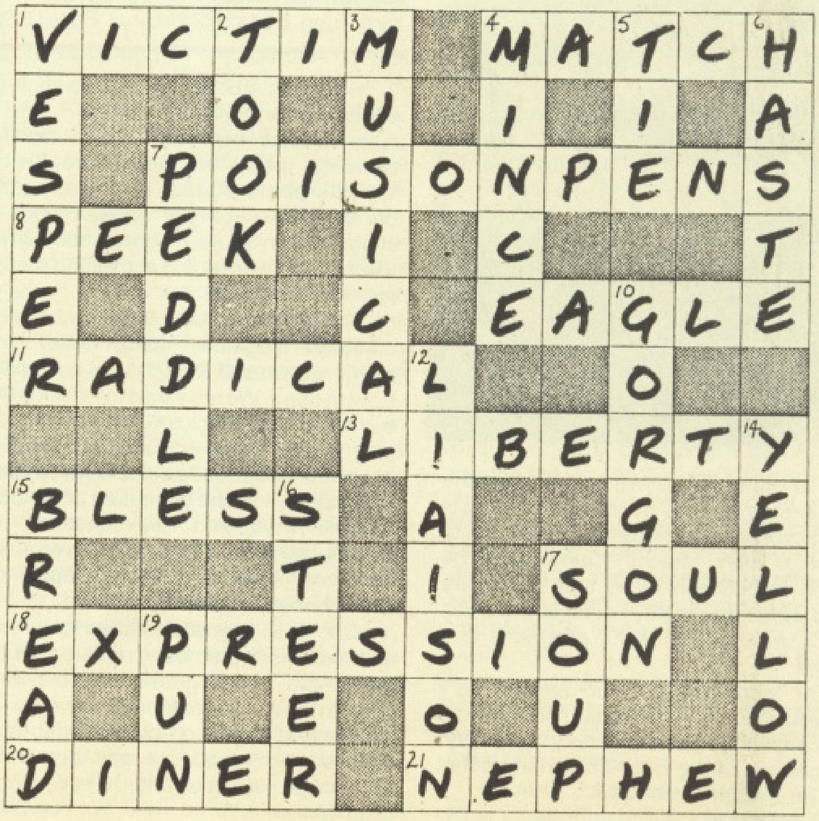
Crossword puzzle solution

We have had a number of replies to our competition in the December issue which asked for replies to certain questions. We have so far been very impressed with the imaginative interpretations of the questions.

Here we give the solution to the crossword puzzle. We have actually had a number of readers who have sent in their solutions. The crossword was not, however, a competition! So there will be no prizes for correct solutions.

We hope you enjoyed doodling with the crossword while recovering from your Christmas lunch and that it gave you some non-computer enjoyment!

Those of you with a competitive bent should turn your attention to our Digitiser Project in this issue. This should provide much more of a challenge than our Christmas competition or the crossword.



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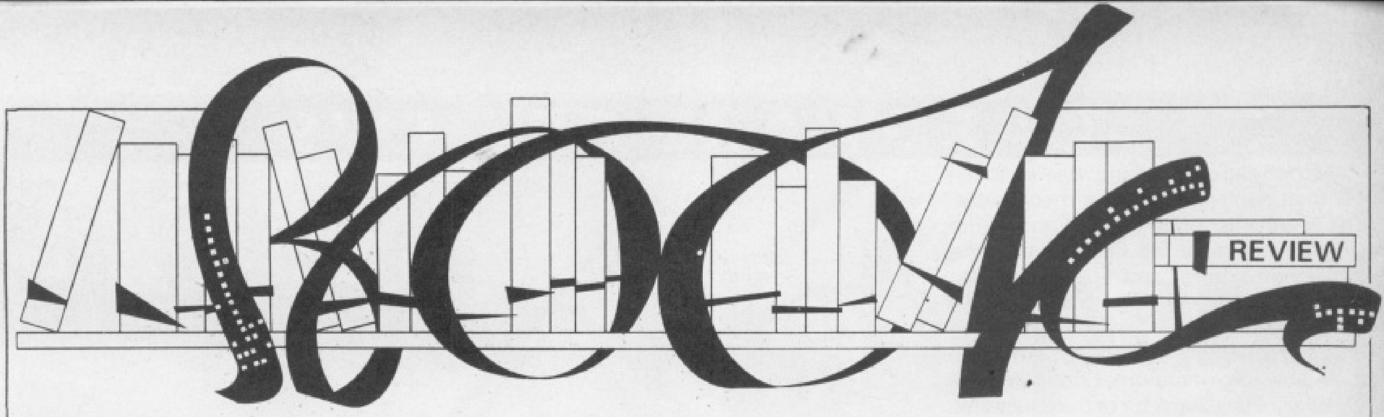
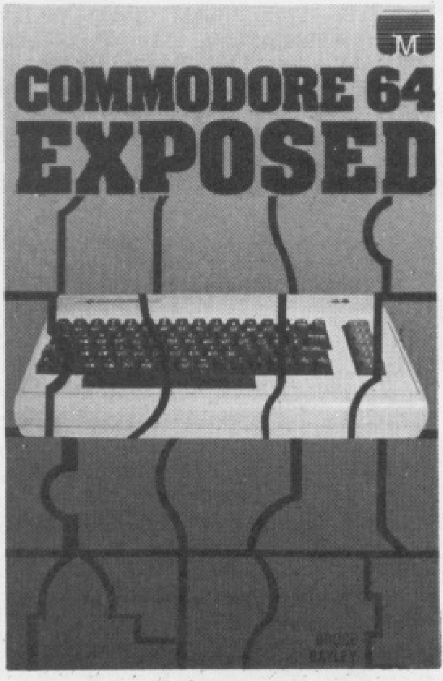


A possible rival publication to The Elementary Commodore 64 is the Commodore 64 Exposed from Melbourne House.

Although the Commodore 64 Exposed purports to be for the first time computer user as well as for the serious programmer, it should not be classed as a book for the complete beginner. Books destined for that class of readership usually contain several pages defining hardware, software, input and output devices. The Commodore 64 Exposed doesn't.



It is pretty fast moving and takes the reader step by step from a set of control instruction descriptions right through to graphics using machine language. The pages in between these two points are filled with some highly useful information and some equally useful programs and tables.

For those readers who are not very experienced, an ideal starting point would be chapter 2. This is simply a list and description of the BASIC commands that can be enabled on the 64.

Probably the best starting point in the book for experienced BASIC programmers is chapter 4 which is all about sound using the 6581 Sound Interface Device. It is this little chip which enables programmers to compose their own tunes and add sound to their own games. This section covers using single as well as multiple voices, filters and resonance.

This section of the book explains in detail how to change the values inside the SID chips internal registers and thus produce the correct note.

The second major selling point of the Commodore 64 is its graphic capabilities which may be controlled directly from the keyboard or by using sections of the memory. Here, the book is excellent as it explores not only border, background and character colours but also goes into the use of multicolour sprites.

The Commodore 64 Exposed is definitely good value for money.

Contact Melbourne House (Publishers) Ltd. Melbourne House, Church Yard, Tring, Herts HP23 5LU Price £6.95.

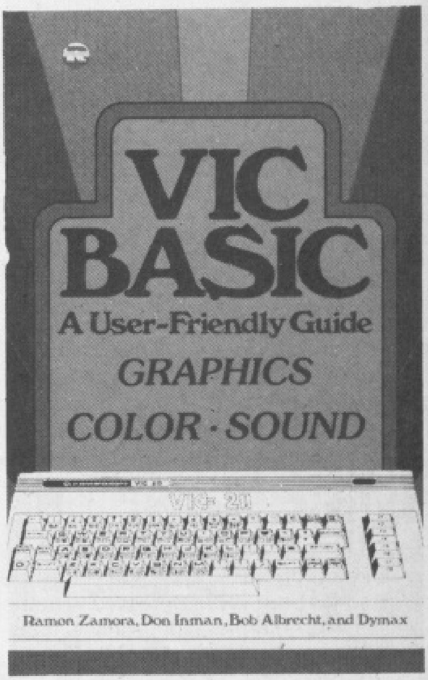
Vic Basic: A User Friendly Guide, is an obviously American publication with a cute cartoon keyboard and numerous drawings taking the reader through the Vic 20's paces. Aimed at beginners the book would probably appeal more to children than adults – sometimes it gives the impression that is is explaining the VIC to a three year old.

The authors assume that the reader is a complete beginner sitting down to a newly purchased Vic 20 with no idea of how to use it. We are asked to imagine that the Vic 20 is in fact a Rainbow Machine and if the book is followed carefully everyone will be magical rainbow makers – wonderful! At the beginning of the book all the keys and key functions are introduced and as the book progresses new commands and Vic 20 capabilities are fully explained and illustrated.

One of the most attractive features of this book is the amount of care that has gone into the diagrams and drawings. These bring the computer alive to the reader and a non computer owner might be tempted to go out and buy a Vic, influenced by the enthusiasm oozing from this book.

After we have learnt what a cursor is, the colour key funtions are introduced. The idea of having a set of questions at the end of each chapter is a good one. The reader can test any knowledge gained in the preceding chapter – the answers are provided, which stops anyone wondering too long about the answer. Next, the reader is invited to go on a Piano Bar Safari and we learn how to make music.

The clear diagrams and simple, but informative text, makes it all seem very easy. Graphic characters are explained along the same lines and once these three functions are understood the reader can then start using them to write programs.



The authors encourage their readers to experiment with the functions they have already learned and continually emphasize the fun aspect of using the Vic 20. They have created a program called a Word's Worth using some of the BASIC language features. The game is essentially a play on words, but its purpose in the book is to introduce BASIC as painlessly as possible.

The next few chapters explain more of the BASIC language and some of the Vic features and functions, including the random number generators, integer functions, controlling integers, and numeric, simple array and string variables. Once those are understood the reader is taught how to create characters and animate them using colour and sound. Special sound effects and harmonious music are taught in the advanced sound chapter.

In the last few chapters the authors explore the use of RND and create simulation such as dice throws and they explain how to put graphics and colour on the screen using POKE statements. Appendices at the end of the book give lists of charts, codes, BASICstatements and other aids to help the reader move onto better things.

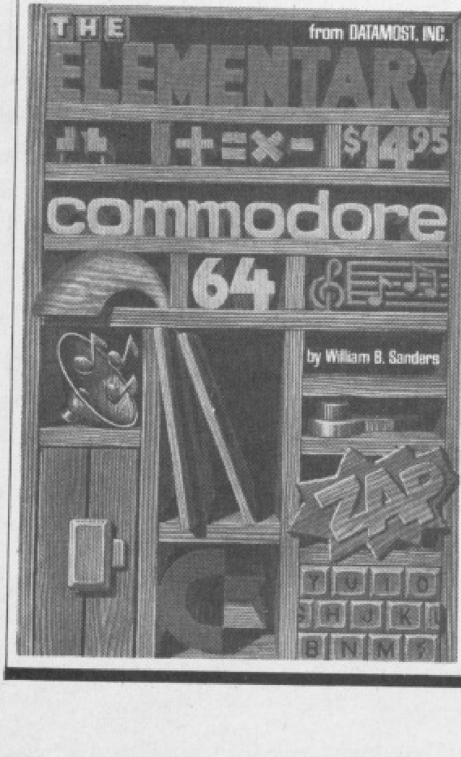
The book makes enjoyable reading and anyone who has just procured a Vic will find this an original and illuminating account of the first stages in learning how to use it. Price £12.70

Contact: Prentice/Hall International, 66 Wood Lane, Hemel Hempstead, Herts, HP2 4RG.

It is the intention of 'The Elementary Commodore 64' to teach people how to program the computer and is for those who are new to the Commodore 64.

You should not be put off by the rather cheap and gimmicky-looking cover even though the cost of £12.70 is rather high.

The first few pages of the book are absolutely essential to the complete beginner because it is here that the reader learns the meaning of certain important terms such as hardware, software and firmware.



Programming is not introduced until later, and so the reader who wants to start on his or her first program has to read pages of text concerned solely with the keyboard. This is, however, useful because it is one of the few beginner books that shows how some of the commands like PRINT can be performed just as well by inputting a seemingly unconnected symbol making programming just that little bit easier.

Each chapter in the book deals with a certain aspect of computing and each is concluded by a summary.

The Elementary Commodore 64 contains a very good chapter on programs, hints and tips which everybody should find very useful. Equally useful are the lists of addresses of Commodore 64 User Groups and hardware and software firms. The only complaint here is that in an English edition the addresses of such organisations should be in England not Phoenix, Arizona. Price £12.70.

Contact Prentice-Hall Intl., 66 Wood Lane End, Hemel Hempstead, Herts HP2 4R6

Taking a break from machine specific books, there is a new edition of 'Computers for Everybody' by Jerry Willis and Merl Miller. This is aimed mainly at those people who have an Orwellian view of computers and think that big brother is an immense machine capable of doing the most terrible things and making horrible mistakes.

The book takes a down to earth look at computers in an attempt to allay fears about the computer. The authors start this task by setting out a simple program to show that the computer has nothing frightening or magical about it.

Any computer illiterate, first time buyer may probably be scared of buying a computer because they do not know how to communicate with the computer or how to program it. It is not the aim of this book to teach the reader how to do this, but the authors attempt to explain the general principles involved in computing and this can be split down into several categories.

The obvious point to start off with is an explanation of what a computer is and this includes a small history of the computer beginning with ENIAC, one of the first computers. This is followed by a clarification of terms. Many people lump all computers under one heading without realising the differences between a mainframe, mini and microcomputer.

No matter what machine the user already has or is intending to buy, there is a very useful chapter on over 100 programs that are currently available. Many of these are just games, but there are some interesting home and business programs as well as educational programs.

The unfortunate thing about this chapter is that none of the programs inform the reader about which machine they are compatible with and most of the software manufacturers are American companies.

Programs are not the only things that the potential buyer will need. Peripherals and hardware options may also be required and several popular pieces of equipment are laid before the reader and these range from the print wheel in the daisy wheel printer to memory boards and disc drives.

This is a very informative book and is the ideal book for the computer illiterate reader to read before he or she takes the plunge and buys their first computer.

Contact Hill and Knowlton (UK) Limited, Hesketh House, 43/45 Portman Square, London W1H 9FG. Tel: 01-486 9021.

Those that enjoy nit-picking will note that the number of programs in the title 34 VIC 20 Computer Programs for Home, School and Office does not and cannot equal the 'three dozen different sets of software' that is quoted on the back of the book. Apart from that, there are few other faults that can be found with this book, written by Howard Adler.

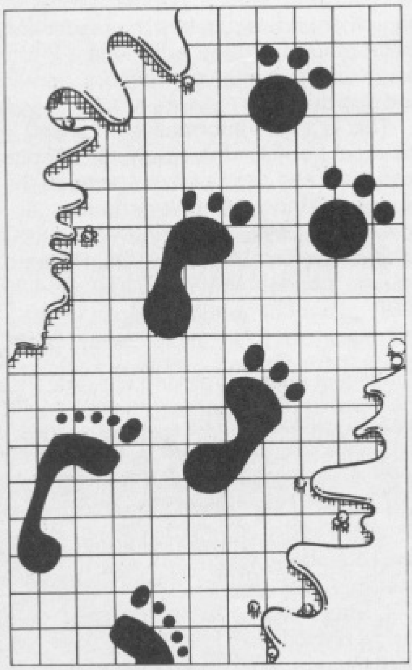
In each case, text is restricted to a simple one or two sentence description of what the program does. Take the example of one of the simpler programs in the book, Funny Similes. The sole object of this program is to spew out a series of dumb remarks and make silly sayings. Entertaining maybe, silly certainly.

Thankfully, not all the programs stoop to this level, one of the more interesting programs concerning itself with photography. This program allows the user to determine f stops in flash photography and close ups.

All of the programs in this book have been designed for easy and quick typing into the VIC 20 and, unlike other books full of programs, the program listings have been written and tested on the VIC and printed out via a 1525 printer. To make sure that no errors appear, the printed output has been reproduced directly from the original copy. Unfortunately, many of the programs do not contain any command telling the micro to terminate the program and thus the same program will be run over and over again. There are two ways to remedy this, the first by sticking in an end statement or leaving out the goto. The second way is to depress the run/stop key manually. Price £7.75.

Contact Elkan Electronics, 11 Bury New Road, Prestwich, Manchester M25 8J2.

Horrific terror in the hands (or paws) of the Werewolf? Well not quite, but The Curse of the Werewolf is a good adventure for the Vic 20 (16K). The commands used are fairly simple and although 'I don't understand' seems to come up annoyingly often, it does have a reasonably wide vocabulary.



The player starts in the village of Kallowstein at the edge of a forest and without much ado reaches the side of a river separating the forest and the castle. Once in the castle courtyard – no mean feat with an aggressive Zombie to deal with – the player can wander in and out of the castle rooms picking up swords, crosses and glowing sticks in pursuit of the Werewolf.

Points are awarded for ridding yourself of evil green Goblins, dwarves and other unpleasant little people. It is important to act swiftly and do the right thing because it is very easy to find yourself with a lot of fatal injuries and escorted out of the game to the sound of the Funeral March.

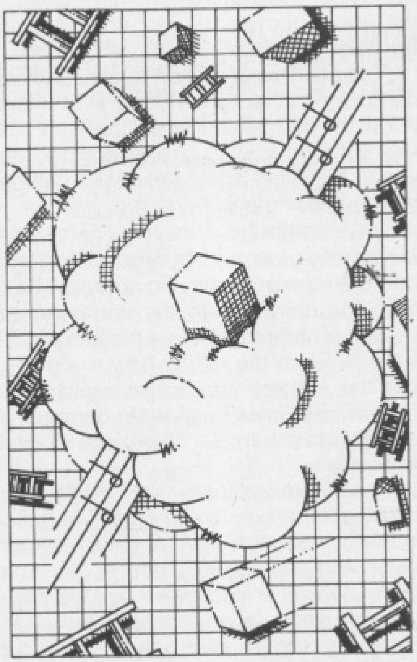
The sound effects provide a professional touch to this game, as the cold wind blowing sounds just like those in the old Werewolf movies and finding a golden amulet brings on a happy tune – is it a clue?

If in a tight corner with any further progress seeming impossible, think again because most of the problems can be sorted out with trial and error and some vivid imagination. If Terminal Software sorted out the bugs in the game it would be a must for adventure game addicts.

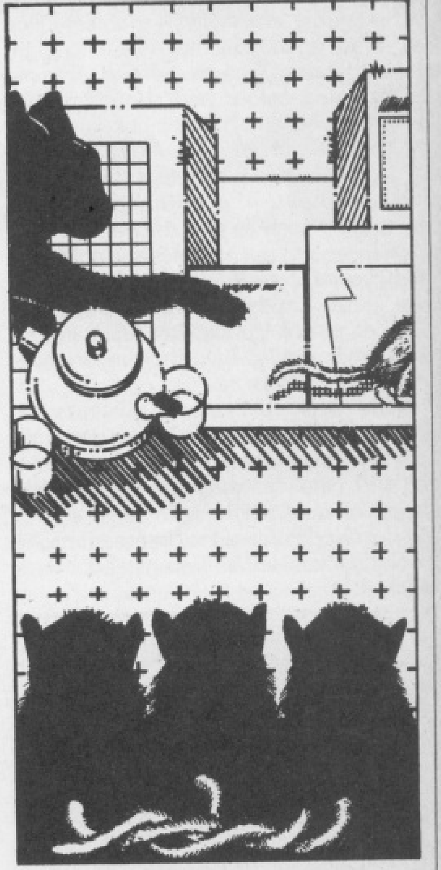
Bonzo is a frustrating game in which the player assumes the role of a workman assigned to collect a lot of boxes from different levels on the screen. Each box has a value, and points are awarded for each one that he picks up as he climbs up and down the ladders connecting each level.

Unfortunately for the workman, the dreaded green Bonzos are patrolling and guarding the levels. If they catch him he disappears in a colourful explosion to the sound of a little tune.

The player gets a chance to play with four workmen, but between each one the screen has to build up the ladders and levels which is a slow process and if you are eager to get on with the next man it gets annoying. A rankings list is available for the entry of high scores. Once the player has worked out how to evade the Bonzos and managed to pick all the boxes up the game becomes more frenetic with three monsters. The boxes have higher values on them and in the unlikely event of all the boxes being collected again, four Bonzos will be on their guard. If these are evaded then the game goes back to having two Bonzos.



Bonzo is for the Vic 20 with a 8K or larger memory expansion and can be controlled by keyboard or joystick. With the latter it is important to make sure all the controls are up on the cassette deck as otherwise it will not work. The Bonzos are quick and malicious and the game is quite fun to play and probably worth the money.



Mirror Group Newspapers have recently formed a new division called Mirrorsoft. Caesar the Cat is for the 64 and is published by Mirrorsoft although written by Andromeda Software.

It is written with young owners of the 64 in mind and should not be touched by people who prefer the faster games.

Many people will disagree with the Publisher's description of this game being a 'fast, all-action, arcade-style game' on two counts. First of all it is certainly not fast and would be even slower if the game were controlled by keyboard and not joystick. Secondly, the game is not 'all action' although this probably does not count for much in the correct age group.

The aim of the game is to guide Caesar along the crowded shelves of a larder in the hunt for several mice who are devouring all the food. At the start of the game you are provided with 1,000 points which decrease as the time passes. The point score can be bumped up by catching the mice of which there are 30 altogether and bumped down by knocking crockery off the shelf.

Despite the rather slow movement of the game, it makes very good use of animation and graphics and is probably worth the £8.95 for these two features alone.

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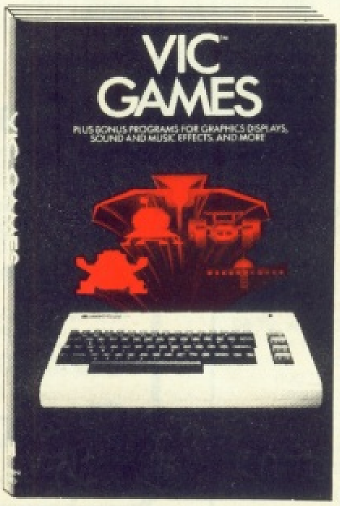
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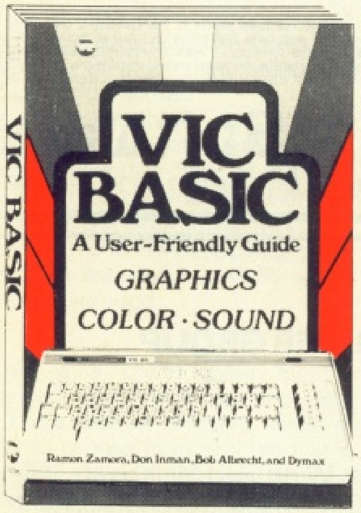
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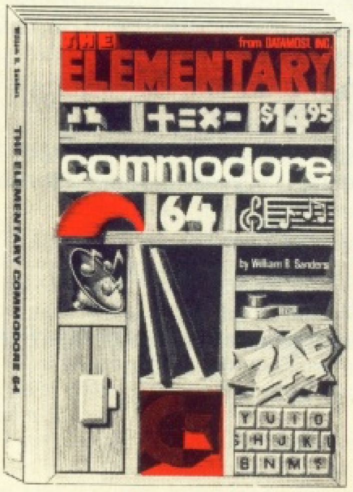
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Mondatta are a fairly new company on the British software market specialising in games. Their assault on the games market has begun with the release of two games for the 64, Taxman and Super Coptor.

Taxman is, as the name suggests, yet another version of the Pac Man made famous by Atari. As with most other Pac Man type games, the principle behind it is very much the same – avoid being caught and gobble up as many blobs as possible.

This is a cassette based game that can be controlled either by the keyboard or by a joystick in port 1.

The aim is to eat as much money as you can without being caught by the dreaded tax men although it is possible to get your own back by eating the tax men as well.

There are six levels of play although the levels of difficulty do not change all that much. The screen display is simply a sort of maze segregated by walls through which the tax men can move but you can't. Point scoring is fairly easy, to eat a tax man gobble a star of which there are several dotted around the screen.

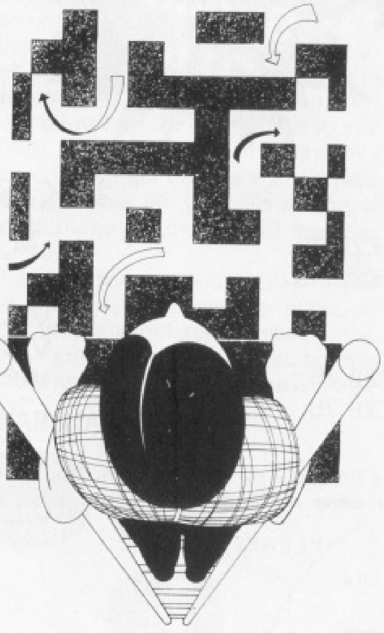
The player has three lives and once these are used up, 'bankruptcy' occurs. The use of sound is fairly limited, but Mondatta can be commended with their use of the micro's colour capabilities.

The cost of this 'nerve popping game' as Mondatta describe it is £5.65 and is simple but quite good.

Get Lost is a maze game for the unexpanded Vic 20 from Terminal Software. There are six different levels of difficulty to choose from and the first is definitely the easiest! The screen is halved and the lower part has the score and direction instructions whilst the upper half shows the scene of the game being played. On one side of the screen a plan of the maze is depicted and the aim is to get from the top left side over to the bottom right corner in the lowest number of moves possible. On the other side a 3-dimensional view of the maze is portrayed. Each maze appearing on the map is different presenting the player with a different challenge each time.

On the first level, the game is comparatively simple and it is possible to get to the home base by guiding the little arrow through the maze without much trouble. Level two is much the same. On level three the maze vanishes and as the player travels along, the path appears in the arrow's wake making any progress quite difficult.

On level four only the arrow's position is visible and the player requires an efficient and accurate memory to reach



the other maze end successfully. The last level really tests your memory as there is just a blank space where the plan view of the maze was and there are no clues at all except the 3-dimensional view.

It is not a game for people who like the thrills and excitement of the 'zap-pow' games but perhaps its merit lies in the fact that once playing, the player becomes determined to beat it. A game provoking concentration and not for those easily bored.

Galactic Abductor is fast exciting nerve-racking game. It takes a long time to load but is worth waiting for as the sound effects and graphics are excellent. The scene awaiting the player is desperate – the armoured space hawks are swooping around in the sky above the players satellites dropping deadly red eggs and carrying off humanoids and the only equipment for defence is a laser.

If a hawk is hit it turns bright purple, but it needs more than one shot to actually destroy them. They fly around erratically in the sky above the satellites and if the eggs dropped are not destroyed before they land on the planet, they will hatch into little white creatures. These then advance on the satellite and contact results in its instant annihilation.

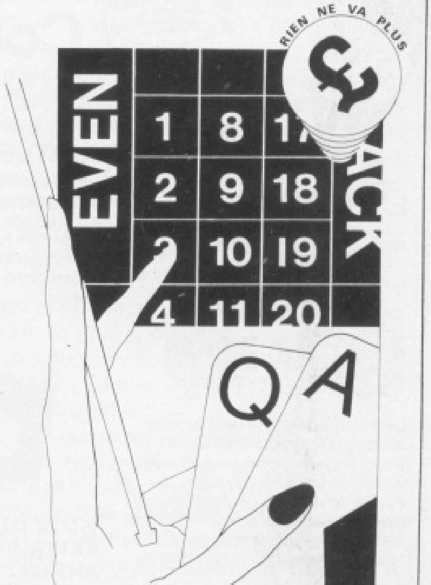
Joystick controls are used and the laser can be fired upwards, to the right or to the left. All through the game sound effects accompany the game's firing activities and any deaths. Occasionally a hawk abducts a humanoid and they can be rescued if the abductor is shot down. The offending hawk can be identified as it has a little man hanging from its beak and the occurrence is marked by 'GOT ME' appearing at the bottom of the screen. If the little person is not rescued a skull drops to the planet surface.

Points are awarded for killing the hawks, rescuing the humanoids and the player gets a chance to rest if an attack has been successfully thwarted as there is a lull of activity. There is a gallery of scores and the players score is displayed on the screen with the highest score underneath it. For the Vic 20 (16k) by Anirog this game is great fun to play.

Mr Chip have launched a new game that incorporates three games of chance onto the same cassette, these being roulette, pontoon and hi-low. Also on the option selection menu is the chance to shuffle the 'cards'.

All of these games observe the rules applied to the normal card game except for pontoon where you can stick on any total you choose until you are bust and there is the chance to make a bit of money whilst enjoying yourself at the same time. The only disappointment is that even if you are £12.00 in credit, you cannot bet more than £9 on any one game. The basic screen display is the same for all the games, each display coming up with a random selection of cards.

This is quite an entertaining selection of games and if you enjoy playing cards and messing about with the VIC then you are bound to enjoy this piece of software.



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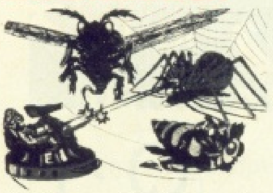
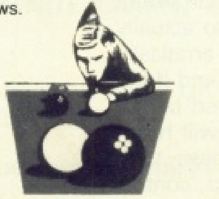


Definitely one of the best arcade action games around for the 64. Shoot the worm and everything else in the garden whilst avoiding the deadly spider and swooping eagle. Machine code using high resolution and Sprite graphics with excellent sound. Beware, it's very addictive.

HUSTLER

Written in machine code and using Sprite graphics HUSTLER takes the 64 to its limits. There are six 'pool' type games for one or two players, high scores kept and super music. Machine code. See the great press reviews.



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The Fabulous Wanda is a new game for the 64 from a company called Games Machine and they claim it to be a fantasy game with arcade action. It is controlled by a keyboard and lives up to the claims of Games Machine. There should not be any problems loading this game although there are a few worrying moments when the player is faced with a blank screen, notably after the first obstacle has been passed. Presumably this may be because certain parts of the program are loading.

The player takes the part of a space traveller looking for good times when you are 'spacenapped' and persuaded to search for Wanda who holds the secret of eternal life. The only other option to getting spacenapped is provided by a very bright yellow message on a white background. In fact the message is so bright it is unreadable! At this stage shift/run stop will take the player back to the beginning.

Avoid doing this and try collecting the dollar signs that build up your currency supply. Once about 3,000 of these 'klebs' have been collected you can go gambling on the planet Copus or get one of the local dolly birds to take you to Wanda.

Should you fail to find Wanda, do not hit the self-destruct. This will take you back to the beginning of the game – the very beginning including reloading.

Good use of colour, graphics and sound for £7.95.

There are two new games from Bubble Bus and both of them are for the 64. The first is Widows Revenge and is a little like Exterminator (which was produced by the same company). The screen is filled with dozens of black and white dots with various bugs crawling all over the place.

One or two players can take part and the aim of the game is to shoot everything on the screen even if it does not move. Everything is worth points and the major obstacles to avoid are the baby black spiders which eat some dots – called energy eggs – and fires back.

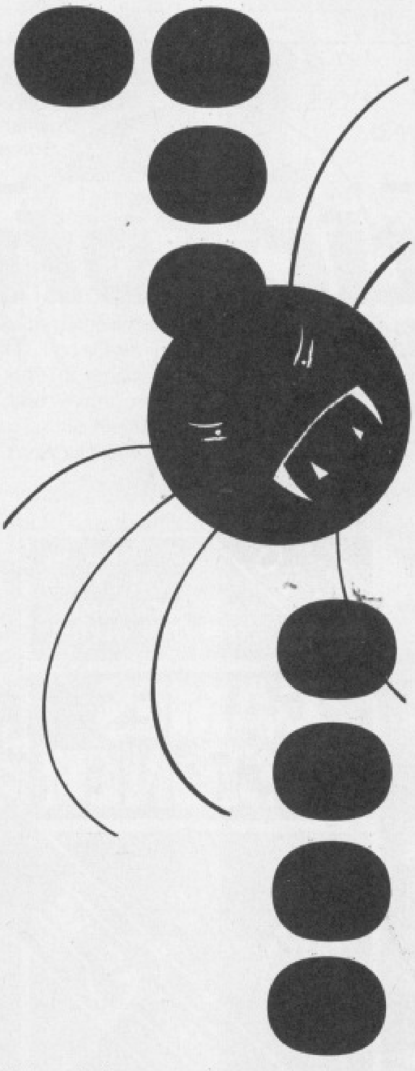
The game gets its name from the large black widow spider that occasionally crawls across the screen. Destroying this yields a mystery number of points. When ten thousand points are reached, a signature tune is played and the player gets an extra cannon. It is also at this point that the game gets vastly more interesting and deadly.

The flashing background is a bit of a nuisance and a distraction, but this can be turned off using F7. All in all, a good game.

Another game for the 64 is from a fairly new company called Beyond Software. The game itself is called 'Goodness Gracious' and control is simply a matter of releasing the space bar at the appropriate time. That in itself should say a lot about the complexity of the game.

The whole object of the game is to prevent some creatures that look like a cross between a frog and a dinosaur from obtaining a red jewel, which is their source of power. This is done by hurling fire balls at them. The longer the space bar is held down the further the fire balls will go. If these creatures get their object then the game is over.

There are two options to play in this game, beginner and expert although there is very little difference between the two. The graphics are very good, but the entertainment value of this game is rather limited.



Although the game bears absolutely no resemblance to an Aztec Tomb, Amazon rain forest or anything so exotic it is a jolly good game. The game is supplied by Alligata for the CBM 64 and takes about fifteen minutes to load, which seems to be a long time when waiting to play a game. It is only recorded on one side of the tape.

The colour and graphics are good and the top half of the screen is a graphical representation of every location the player has managed to reach. Below that is the text. Furniture and objects are listed at the side of the picture, but it is important to examine everything closely for further clues. In the dining room which is where the player starts his sojourn, a table-ladder is evident. A table-ladder? a table and a ladder! The aim of the game is to find the lost Aztec tomb hidden somewhere in the land and the most important qualities for a prospective adventure would be patience and persistence. All avenues of thought must be utilised and imagination applied to all the possible clues.

The commands are fairly simple with two words and quite often it will not understand a word in one context, but understand it perfectly in another. It has the usual one letter commands for directions: N,S,E,W. The player is given no other clue than the aim and so it is an enjoyable challenge. Anyone keen on the Adventure games could do worse than to acquire a copy.

Astral Zone is a superb game for the 64 from Channel 8 Software that requires a joystick in port 2.

The most imppressive feature of this game is the three dimensional graphics which are little short of brilliant.

Astral Zone is all about battling against hordes of invaders, but this time they are not the usual space invader sprite. They are directed straight at you and are very fast which indicates that the game was written in machine code. It sounds pretty simple – shoot the aliens and score the points – but it's not. In fact it is addictively difficult. Just as you see the enemy in your viewfinder and fire, the enemy has moved position and you have missed. There is one other factor that makes the whole game very difficult.

Move the joystick up and you expect the viewfinder to move up. Not so. You go down instead! The rule for controlling the movement is this: whichever way you want to go, move the joystick in the opposite direction and it is possible to scroll up, down, right and left in this all-action game.

This game can be played by one or two players. Hits against you are recorded by a damage counter and at 100% damage the game is over. However, with the score at 5000 points the damage total is reduced by 20%. Congratulations to Channel 8 Software and the programmer Mark McKee for producing a game that is a winner.

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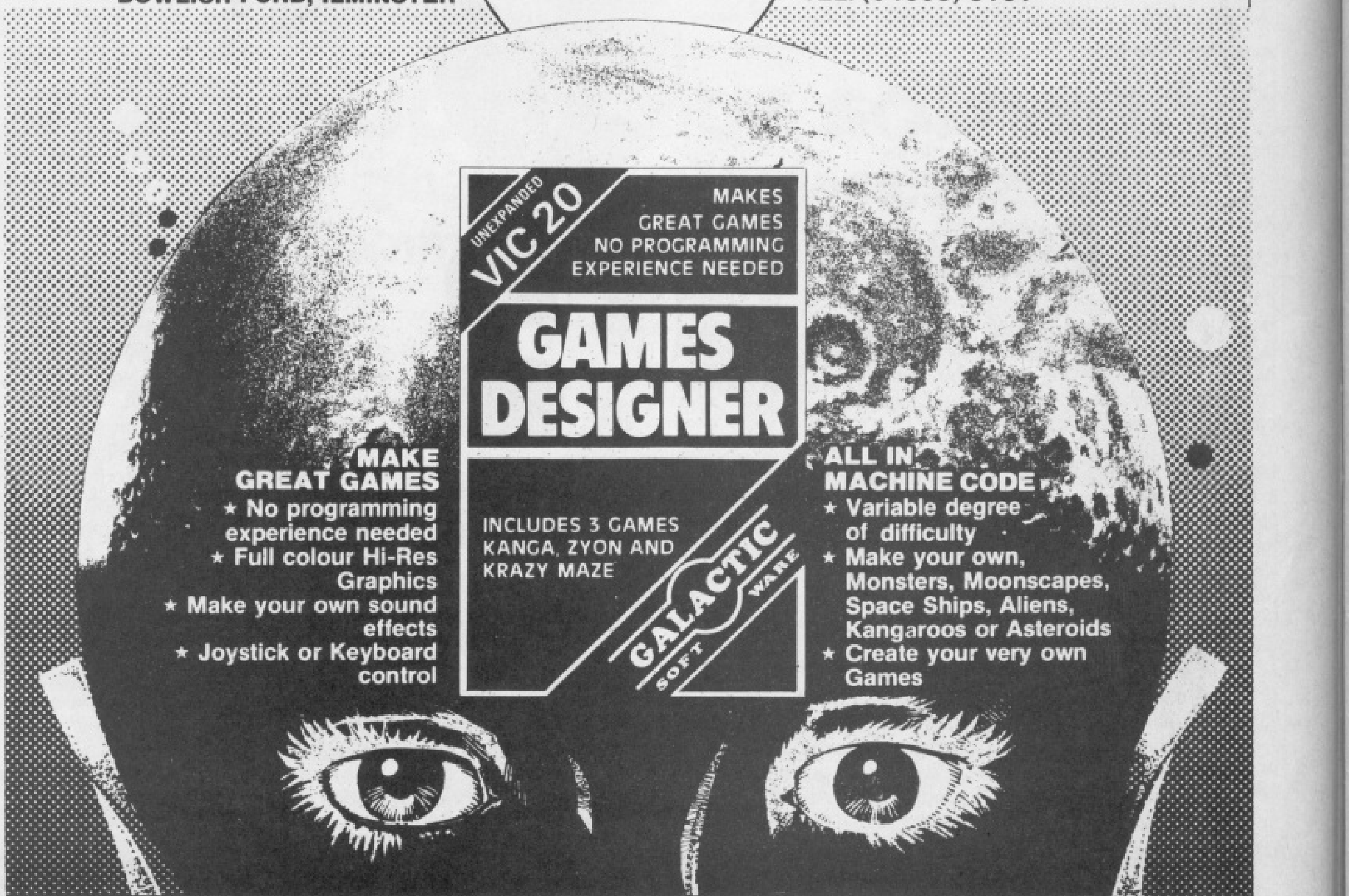
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GAMES

The adventure game Mission Om is part of a series of new games from Spectresoft, the sequel of which is a game called Crisis Countdown. Mission Om comes on cassette and is controlled by the keyboard. It is quite a good game if you can get it to load. However, there appear to be some difficulties in doing this.

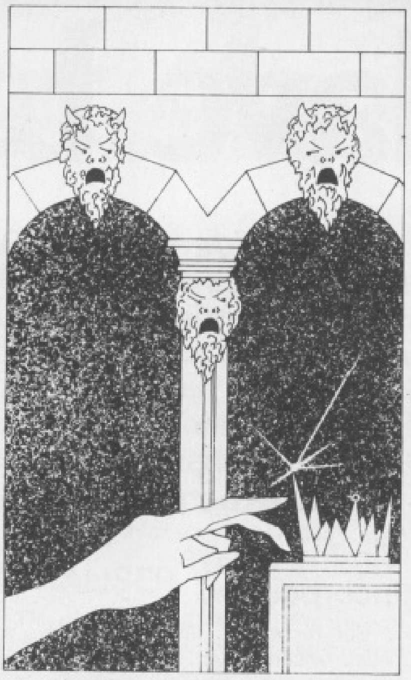
If you follow the rather sparse instructions on the leaflet you should load "" and must not do the usual shift/run stop for games on the 64. This latter loading operation will result only in a blank screen. Loading according to the instructions is a rather strange affair because practically nothing happens until the end of the tape.

'What happens then?' I hear you ask. Well, silly it might sound, but you rewind the tape, put the other side in and hit any key. It sounds if you are starting all over again, doesn't it?

Well that is not true, because the player is now confronted with a continually flashing screen which seems as if it is not going to stop. It eventually does and at long last the game appears.

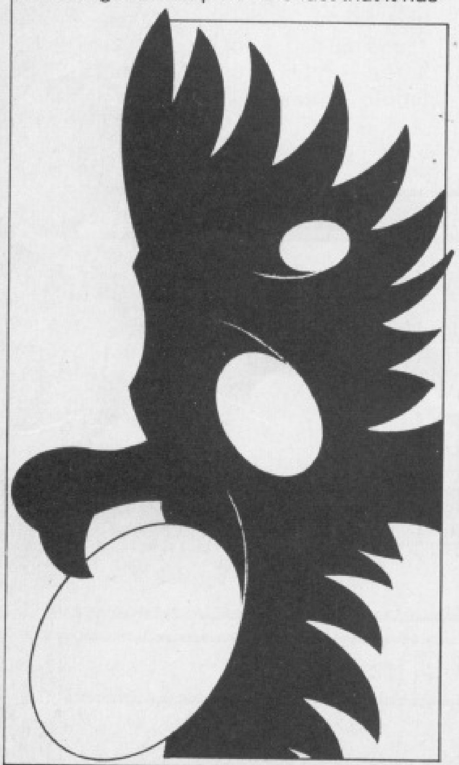
Mission Om is an adventure game for the 64 and the object of the mission is to find the password which will allow you to recover the symbolic crown of Om.

There are, of course, several difficulties that must be overcome – the stone gorgon which has a nasty habit of killing the player, for instance.



The game is a little bit like Dungeons and Dragons except for the fact that it has nowhere near the same number of levels. The similarity lies in the sort of information the player is given at the start – strength, spell points etc. – and that is where the similarity ends.

The screen is split in two and is divided into descriptions of places and prompts and every now and then some good graphic nasties appear. Not a bad game really at £7.95.



Another game for the 64, this one is called Vultures and is Published by J Morrison Micros. It cannot be operated from the keyboard but requires a joystick in the second user port.

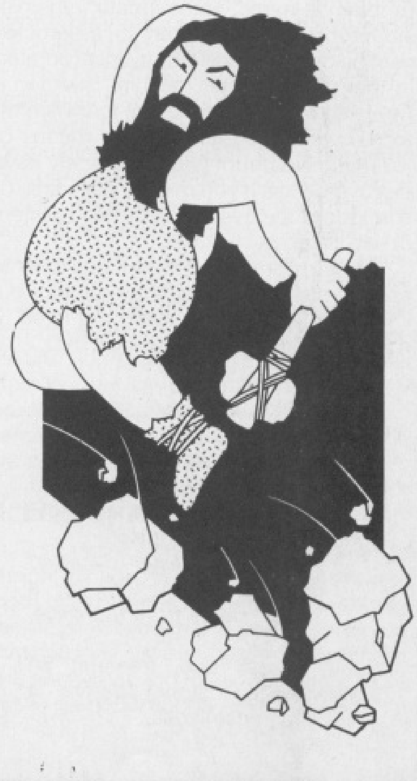
Getting the hang of the game is quite easy – destroy the alien vultures before they destroy you. However, it is quite difficult at first to get past the first one or two waves of vulture attacks. There are two ways that they can destroy you. They can either pick you up and carry you off or they can drop eggs on you. Once you have fought off the first wave of vulture attacks, a second is waiting and so-on. Eventually the player does get the benefit of having extra lives added.

The graphics to this game are fairly simple – all you have on the screen are the vultures which move around fairly slowly and yourself, the movement of the latter leaving something to be desired. The action is hardly breathtaking as Morrison Micros would have us believe and in fact the only reason for carrying on playing this game is to get the high score and enter a name in the hall of fame.

The scene is set in prehistoric times with a mountainous landscape in the background. A caveman stands in the foreground facing an onslaught of extinct creatures and rolling rocks. The sprites are excellent and the various figures look very realistic. It is a very amusing game especially with the funny noises coming from it as the caveman jumps over the rocks or lands on them. If there is a disaster, a spectacular colour display appears in the sky and the caveman disappears.

The game needs a joystick and is for the CBM 64. The first problem facing the caveman is a series of rocks rolling from the left side of the screen, which he has to jump over. It is important to get the timing exactly right as mistakes are fatal. After the rocks, come the dinosaurs and a well aimed hit with the axe diminishes them in size. Once you get to the dodos, skill and good reflexes are essential for dodging them as they move in leaps and bounds. If you manage to get past these, the prehistoric birds carrying rocks have to be negotiated as they try to drop them on the caveman.

The player has three cavemen per game, but even with three chances it can be a very frustrating and annoying game to play because if there is the slightest mistake in the timing, the player has to start all over again.



The slave becomes

After last month's digression on the BBC Micro, Owen Murcott continues his articles about DIY connection of two Commodore computers through their user ports. This month, he shows you how careful timing will get two machines to acknowledge each other's presence in all circumstances. He has included two useful routines for PET, VIC and CBM64, which transfer blocks of memory and variables between them.

So far in this series I have given you passive programs. That is to say, in each of them one machine was always the master and the other was always the slave. You needed to run the program in the master machine first to set up the various registers in the interface chip. Otherwise, it would wait for ever to get the slave's first "ready" signal if the slave had been started first. Actually, the slave would already have sent this signal, but because the master program was not running, it would have been detected by the master's interface chip.

This really is quite a nuisance. The problem is much worse if data transmission routines are written in assembler, with no test for the STOP key incorporated in them. The master machine sticks in a never-ending loop. You have to switch off to recover if there is no other means of resetting. No doubt you will already have discovered this if you ran the slave first, or configured the system with two masters or two slaves by mistake.

For the moment, I will continue to write about master-slave configurations, but will show you how to avoid the need to run a specific machine first. Do it by:

- Making the slave (if started first) continually send 'ready' handshake signals, until the master has acknowledged with a handshake that one of the 'ready' signals has been recognised;
- Making the master (if started first) continually look for a 'ready' signal from the slave, and when it gets one, transmit an 'acknowledged' signal before it goes on to transmit data.

Timing delays incorporated

But there is a timing problem. You must ensure that handshake signals between the machines happen in a specific sequence. Otherwise, I have found that they can be misinterpreted. So you have to build in some delays to give time for things to happen.

Look at Figure 1. It is a timing diagram based on assembler instruction times, measured in microseconds. This timing is critical in assembler programs. When you study the diagram, remember just what a "handshake" is. It is a change from 1-0. Receipt of the change automatically sets a flag (a specific bit) in the user port interface chip. The flag can be interrogated with a PEEK at any time later in your program. This is how you detect that the change has occurred.

When the slave sends a 'ready' signal, the master's flag is set (provided that the machine is running). The slave must then wait long enough to allow the master to test for and recognise this signal and acknowledge it. The waiting time must exceed the total time for the master to do two tests to see if its flag is set, to branch and to send an acknowledgement. When the slave's flag has been set by an acknowledgement, the slave branches to look for transmitted data.

The timing must handle the worst case. This is when the master tests just too early for the 'ready' signal at test number 1, and the flag is not yet set. It will catch it at test number 2, and there must still be time to respond.

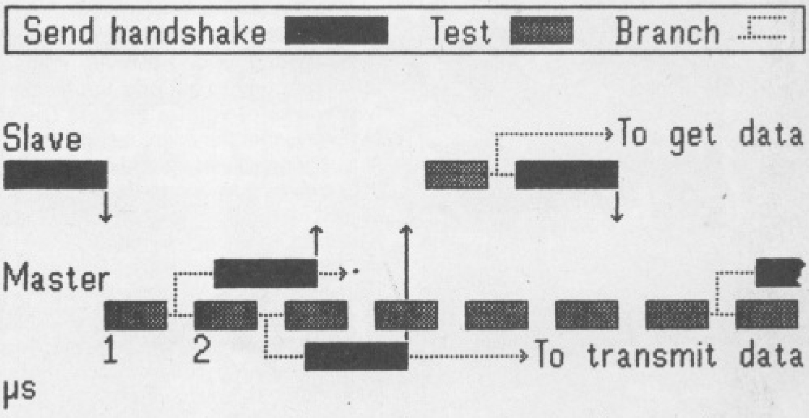


Fig 1 – Timing

s master of the slave

Confusion

Fig 2 shows what could happen if the delay is only enough for one test for 'ready', plus an acknowledgement. When the master is slightly out of step, it will respond some measurable time after the 'ready' signal is sent. The slave will not see the master's acknowledgement at the first test for it, and so sends the next 'ready' signal. Whilst it does this, the master goes on to send a data byte because it assumes that the slave is ready. This will be followed by a handshake to signify 'data sent'. If the slave has not yet tested for the master's original acknowledgement signal, that handshake will have no effect – the slave's handshake flag is already set.

The slave then detects the earlier acknowledgement, and clears the handshake flag. It awaits another handshake to say 'data sent'. In the meantime, the master has interpreted that extra 'ready' signal as 'data received' and sends the next byte with a handshake.

Confusion reigns. The first data byte has been ignored. The remaining transmissions will be corrupted if that first byte was part of a transmission protocol header. This may cause the machines to hang-up. (In article three, I defined "protocols" as the rules and etiquette for communication. They include the control characters, addresses and handshake signals transmitted to enable communication to be complete and unambiguous.)

Do not make the delay too long, though. Otherwise the slave may not yet have tested for the acknowledgement signal when the subsequent 'data present' handshake is sent. Try drawing your own timing diagram on a piece of squared paper, and you will see what I mean!

INITIALISER

The program "INITIALISER" at the end of this article is no more than a skeleton in BASIC to show how to incorporate this timing principle. You can experiment with it. Reduce the length of the FOR-NEXT delay loop in line 410. You will find that this generally makes no difference, because BASIC instruction times occupy milliseconds and the timings are so coarse. Just occasionally, however, the machines may clash. If you run the program again, they will probably work correctly. But try removing the loop altogether (turn it into a REM statement) and see what happens! Run the master first. Then try running the slave first.

If you understand assembler, translate the routine into assembler statements. You can do it more or less directly. Then the loop is vital! You will need to add up the instruction timings in microseconds for your master and slave handshaking routine, to establish the length of delay needed. Typically it will be 30-40 microseconds. Beware of interrupts – you must disable them with SEI before the routine starts. If you don't, an interrupt could occur at the wrong moment, and delay the master's response. The slave's test for the acknowledgement would then come too soon and the acknowledgement would not be detected (see Fig 2).

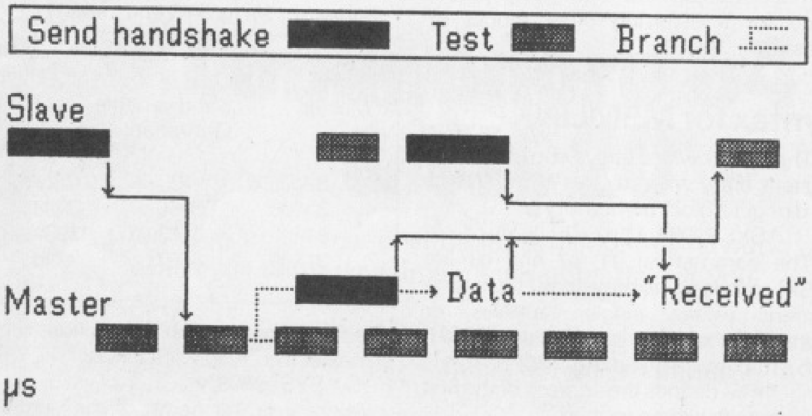


Fig 2 – Out of step

Transfer BASIC programs

Two months ago I gave you a machine code routine which transfers program text from one machine to another. I pointed out that if you use it to transfer machine code programs you will spoil them. This is because my program transfer routine is designed only to transfer programs written in BASIC. Such programs contain pointers which link one line of program text to the next. Their function is to speed up the interpreter's search for lines when it executes GOTO and GOSUB statements.

The PROGLINK machine code routine recalculates these pointers when the program has been transferred to the destination machine. If the transferred program was machine code, some of the bytes would be over-written by the attempt to insert pointers. Machine code programs do not contain link addresses. However, I included this re-linking feature in the routine so that it would work with all combinations of machine. The start-of-BASIC address is not the same in all Commodore computers, and the pointer values may change when BASIC programs are transferred. So they have to be recalculated.

Transfer memory

To transfer a machine code program is simply a matter of moving a block of bytes from one machine to another. You should realise, however, that if you wish to run that machine code in the other machine, it will normally need to be transferred to sit at the same locations. This will certainly be true if the program contains JMP instructions (equivalent to BASIC GOTO), JSR instructions (equivalent to BASIC GOSUB), or instructions to load or store bytes, with access locations within itself. Few machine code programs are written to be truly independent of their location.

The MEMORY LINK program given at the end of this article, like previous ones, has a master-slave arrangement, but it does incorporate the timing delay described earlier. So it does not matter which machine starts first. The program shows how to use a machine code routine named MEMLINK. This routine will transmit a block of bytes of any length from one machine to the other. The block of bytes does not have to be a machine code program. It could be a single byte value; it could equally well be the screen memory.

Transfer the screen

The block of memory transferred by the MEMORY LINK program is, indeed, the screen memory. The master specifies the destination address, so needs to identify the type of slave machine (lines 200-250) to get the correct destination and screen size. Commodore screen memories are all over the place! This is done by using the MEMLINK routine also to transfer single bytes. It gives the same effect as the PEEKER/POKER program, described in the third article in this series, but that one really was too cumbersome for general use! Use MEMLINK instead.

Transfer colour

If the slave is VIC or CBM64, the transfer might also need to be repeated in order to transfer the colour memory, so that the transferred screen memory becomes visible. You would need to add extra coding for this just after the point where each screen is sent. The addresses of colour memory are:

* VIC 38400-38905
* CBM 64 55296-56295

If you want to POKE directly to the screen on VIC and CBM64, without needing to POKE the colour memory, there is another trick which you can use. First set the background to the colour required for the printing. Clear the screen. This prints space characters and also stores that background colour code in the colour memory locations. Then change the background colour to give a contrast. When you POKE, characters will be visible, (but only in the original background colour). Do not let the screen roll or you will spoil the effect.

MEMLINK

I have provided the MEMLINK routine as a loader for hexadecimal machine code contained in DATA statements in the MEMORY LINK program. Type it in, RUN it, and it will POKE the machine code into the memory. The loader portion contains a sumcheck to catch any typing mistakes. If you are using a VIC, you will need to leave out the DATA statements for other machines, and also the remarks, to reduce its length. But do not remove lines 60170 and 60370, unless you also bypass lines 80 and 90. The asterisks are used as markers to identify the sets of machine code.

You will find that my loader is not fast. It takes time to decode hexadecimal. But it is easier to check (or even alter if you know how). It takes up to 10 seconds to skip the code for other machines (lines 70-90) and 30-35 seconds to POKE its own.

Unlike my PROGLINK routine given two months ago, MEMLINK is not relocatable. It is poked to specific locations in the memory. I have assembled versions for 32K PET BASIC2 and BASIC4, unexpanded VIC and with 3K expansion, and for Commodore 64. They reside at the end of BASIC memory (just below DOS Support on the PET). The addresses for the SYS entry to MEMLINK are:

		BASIC 2	BASIC 4	VIC	CBM64
* Slave		32000	32000	7168	40448
* Master	Send memory block	32007	32007	7175	40455
	Get memory block	32011	32011	7179	40459

After you have loaded and run MEMORY LINK to its end, you can use the MEMLINK machine code routine over and over. It will still be there at the end of the memory. Experiment with it in direct mode for transferring other blocks of bytes.

Syntax for MEMLINK

The syntax which I have chosen for the master's entry when it uses MEMLINK to send or get a block of memory is:

* SYS 99999, e1,e2,e3

The parameters: e1, e2 and e3 are BASIC numeric expressions (including numeric values, single variables, or expressions of any complexity desired) with a maximum value of 65535:

* e1 – defines the address of the first byte to be transmitted;

* e2 – defines the address of the last byte to be transmitted. If e2 is less than or equal to e1, only one byte (from e1) will be transmitted. No error message is given;

* e3 – defines the start address of where the block of bytes is to be replaced in the receiver machine.

The slave's entry is just SYS 99999.

Transfer variables

When you write programs to run on two machines there will be occasions when you will need to transfer variables from one machine to the other. The MEMLINK routine could easily be modified to transfer a block of numeric variables or arrays. After all, their start and end addresses are known. However, if string variables are inter-mingled with them, the problem becomes complex; the actual strings may be in the BASIC text, or may be at the other end of memory. So it is better to arrange to transfer variables one at a time.

VARLINK

I have given you a loader for a machine code routine, named VARLINK. As does MEMLINK, so this too runs in a master-slave configuration. Type it in, run it, and the machine code will be poked into the memory. You can then use it to transfer a numeric variable or string variable. The variable's value will be assigned to a variable of the same name in the other machine. The loader is of the same style as the MEMLINK loader and for the same machines. However, VARLINK is loaded to different addresses and so can reside in memory adjacent to MEMLINK, and at the same time. The addresses for its SYS entry are:

		BASIC 2	BASIC 4	VIC	CBM64
* Slave		31488	31488	6656	39936
* Master	Send variable	31495	31495	6663	39943
	Get variable	31499	31499	6667	39947

The syntax which I have chosen for the master's entry to VARLINK is:

* SYS 99999, v

where v is the name of the variable to send or to get. The normal rule of BASIC applies in that variables which have not already had a value assigned will be zero or null string when transmitted.

The slave's entry is just SYS 99999.

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Transfer arrays

VARLINK is not constructed to transfer arrays directly. If arrays must be sent, you can use VARLINK to do it by:

Taking the array elements one at a time;

Assigning each in turn to the variable used for transmission;

Transferring that variable repeatedly until all the elements have been dealt with;

Re-assembling the array at the other end.

Keep in step

You will see that when you use MEMLINK and VARLINK you have to be careful to keep the machines in step with each other. For each point where your 'master' program wishes to transmit (or get), there must a corresponding point in the 'slave' program at which it is ready to respond. Otherwise communication will not take place. Look at lines 510-520 of the MEMORY LINK program. The slave just waits for the master and cannot go on until the master has communicated.

Although either machine may adopt the master role, they must not do it simultaneously otherwise the system will just hang up. If both machines are trying to talk, neither will listen.

Polling

Quite often, processing requirements are such that the machine must not wait for communication. To do this, one machine must periodically look to see if the other wishes to communicate, and if not, to go on with whatever it was doing. If it discovers that the other does wish to communicate, the program breaks off what is was doing, for a moment, handles the transmission, and then continues where it left off.

"Looking to see" is called "polling". Games often do this. When you use a statement like 'GET Z$' to get a keypress, your program looks in to the keyboard buffer. If Z$ is not blank, a key has been pressed, and the program may go down an alternative path. So the program is polling the keyboard.

In polling systems, one machine must be the master. It sends a polling signal to the slave to invite communication. If the master-slave situation is our two machines linked through their user ports, the signal could be a simple handshake signal. If a 'no' response is received (or no acknowledgement within a fixed time) the poll will be repeated after a decent time interval. Notice that the slave does not impose itself on the master; the master invites communication when it is free. (Your programs which 'GET' from the keyboard work in this way.) From the slave's point of view, it has to wait until the master signals that it wants to talk, or that it is ready to listen.

Interrupting

Some systems require machines to be equal partners. In this case, either machine can impose itself on the other, interrupt it, and demand attention. Neither is master nor slave; they are equal partners. This kind of system can be best implemented using the interrupt mechanism built in to the hardware of the microprocessor. (An interrupt is a special kind of electrical signal which can be detected by the microprocessor.)

Communications routines which use interrupts must be written in assembler as BASIC is too slow

```
10 REM           INITIALISER                          W.OWEN MURCOTT NOV 1983
11 REM------------------------------------------------------------------------
20 REM                                           REGISTER ADDRESSES AND VALUES
21 :
30 DATA 59457,59459,59467,59468,59468,59468,59457,59469,254,224,224,223,2
40 DATA 37136,37138,37147,37148,37148,37148,37136,37149,239,224,224,223,16
50 DATA 56577,56579,00828,00828,56578,56576,56589,56589,0,4,4,251,16
52 REM------------------------------------------------------------------------
60 MT=PEEK(65534)+256*PEEK(65535): REM                     DETECT MACHINE TYPE
61 IF MT=65394 THEN FOR I=1 TO 13: READ Z: NEXT: GOTO 70: REM         IT'S VIC
62 IF MT=65352 THEN FOR I=1 TO 26: READ Z: NEXT: REM                IT'S CBM64
63 REM                                                      ALL OTHERS ARE PET
64 REM------------------------------------------------------------------------
70 READ DR,DD,AC,PC,HE,HS,HT,IC: REM                 SET UP REGISTER ADDRESSES
80 READ K1,K2,K3,K4,K5: REM                          SET UP REGISTER VALUES
81 REM------------------------------------------------------------------------
90 POKE AC,0: REM                          DISABLE AUXILIARY CONTROL FUNCTIONS
91 POKE PC, PEEK(PC) AND K1: REM           SET HANDSHAKE = 1-0
92 POKE HE, PEEK(HE) OR K2: REM            ENABLE HANDSHAKE
93 Z=PEEK(HT): REM                         ENSURE HANDSHAKE BIT IS CLEAR
94 POKE HS, PEEK(HS) OR K3: REM            SEND FIRST HANDSHAKE = 1
95 REM------------------------------------------------------------------------
100 PRINT "PRESS M=MASTER S=SLAVE"
101 GETZ$
102 IF Z$="S" THEN 400
103 IF Z$<>"M" THEN 101
105 REM-----------------------------------------------------------------------
200 IF (PEEK(IC) AND K5)<>0 GOTO 220: REM          TEST 'READY'
210 IF (PEEK(IC) AND K5)=0 GOTO 200: REM           TEST #2
220 GOSUB 2000: REM                                SEND 'ACKNOWLEDGED'
230 PRINT "RECEIVER IS AVAILABLE"
240 POKE DD,255: REM                               DATA DIRECTION = OUTPUT
250 I=65: REM                                      CHARACTER VALUE
260 :
```

```
300 POKE DR,I: REM                                SEND CHARACTER
310 GOSUB 2000: REM                               SEND 'DATA SENT'
320 I=I+1: IF I=91 THEN END
330 GOSUB 1000: REM                               WAIT 'READY'
340 GOTO 300: REM                                 FOR NEXT
399 REM----------------------------------------------------------------------
400 GOSUB 2000: REM                               SEND 'READY'
410 FOR D=1 TO 300: NEXT: REM                     DELAY LOOP
420 IF (PEEK(IC) AND K5)=0 GOTO 400: REM          TEST FOR 'ACKNOWLEDGED'
430 PRINT "ACKOWLEDGEMENT RECEIVED": REM          GO ON
440 POKE DD,0: REM                                DATA DIRECTION = INPUT
460 :
500 GOSUB 1000: REM                               WAIT 'DATA SENT'
510 Z=PEEK(DR):PRINTCHR$(Z);: REM                 GET CHARACTER
520 IF Z=90 THEN END
530 GOSUB 2000: REM                               SEND 'READY'
540 GOTO 500: REM                                 FOR NEXT
999 REM----------------------------------------------------------------------
1000 IF (PEEK(IC) AND K5)=0 GOTO 1000: REM         AWAIT HANDSHAKE
1001 RETURN
1002 REM----------------------------------------------------------------------
2000 POKE HS, PEEK(HS) AND K4: REM                SEND HANDSHAKE = 0
2001 POKE HS, PEEK(HS) OR K3: REM                 SEND HANDSHAKE = 1
2002 RETURN
2003 REM----------------------------------------------------------------------
```

```
10 REM              MEMORY LINK                        W.OWEN MURCOTT NOV 1983
11 REM------------------------------------------------------------------------
20 REM                          MM=MACHINE TYPE : SM=SLAVE MACHINE TYPE
21 REM                          M=START OF MEMLINK : MH=END MEMORY POINTER
22 REM                          MS=MASTER SCREEN START : SS=SLAVE SCREEN START
23 REM                          L=SCREEN LENGTH (TO CATER FOR VIC)
24 REM                          A,B,C=MEMLINK TRANSMISSION ADDRESSES
29 REM------------------------------------------------------------------------
30 PRINT "STARTING"
40 L=999
50 MM=PEEK(65534)+256*PEEK(65535): REM                     DETECT MACHINE TYPE
60 IF MM=58907 THEN MS=32768: MH=53: GOTO 100: REM                  ... BASIC2
61 IF MM=58434 THEN MS=32768: MH=53: GOTO 90: REM                   ... BASIC4
62 IF MM=65394 THEN MS=7680:  MH=56: L=505: GOTO 80: REM               ... VIC
63 IF MM=65352 THEN MS=1024:  MH=56: GOTO 70: REM                    ... CBM64
64 PRINT "MACHINE NOT KNOWN": END
65 :
69 REM------------------------------------------------------------------------
70 READ Z$: IF Z$<>"*" THEN 70: REM               SKIP CODE FOR OTHER MACHINES
80 READ Z$: IF Z$<>"*" THEN 80
90 READ Z$: IF Z$<>"*" THEN 90
99 :
100 Z$="": GOSUB 50000: REM                       LOAD MEMLINK CODE
105 REM-----------------------------------------------------------------------
120 PRINT "PRESS M=MASTER S=SLAVE"
121 GET Z$
122 IFZ$="M" GOTO 200
123 IFZ$="S" GOTO 500
124 GOTO 121
125 REM-----------------------------------------------------------------------
200 REM                                                                 MASTER
210 A=65534: B=65535: REM                         SET LOHI ADDRESSES OF IRQ
211 C=828: REM                                    TO PUT BYTES IN CASSETTE BUFF
220 GOSUB 1002: REM                               GET SLAVE MACHINE TYPE = IRQ
230 SM=PEEK(828) +256*PEEK(829): REM              TO DEDUCE SLAVE SCREEN ADDR
231 IF SM=58907 THEN SS=32768: GOTO 250: REM                        ... BASIC2
232 IF SM=58434 THEN SS=32768: GOTO 250: REM                        ... BASIC4
233 IF SM=65394 THEN SS=7680: L=505: GOTO 250: REM                     ... VIC
```

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```
234 IF SM=65352 THEN SS=1024: GOTO 250: REM                            ... CBM64
235 PRINT "SLAVE MACHINE NOT KNOWN": END
236 :
250 PRINT "[D]SLAVE MACHINE SCREEN STARTS AT";SS
251 :
300 PRINT "[D]MESSAGE FROM MASTER": REM           PUT SOMETHING ON SCREEN
310 A=MS: B=A+L: C=SS: REM                       SET ADDRESSES
320 GOSUB 1001: REM                              SEND MASTER SCREEN
330 A=SS: B=A+L: C=MS: REM                       SET ADDRESSES
340 GOSUB 1002: REM                              GET SLAVE SCREEN
350 END
399 REM-------------------------------------------------------------------------
500 REM                                                                    SLAVE
510 GOSUB 1000: REM                              MASTER ASKS FOR MACHINE TYPE
520 GOSUB 1000: REM                              MASTER SENDS SCREEN
530 FOR I=1 TO 5000: NEXT: REM                   PAUSE FOR EFFECT
540 PRINT "[CLS]SLAVE'S REPLY"
550 GOSUB 1000: REM                              MASTER GETS SCREEN
560 END
999 REM-------------------------------------------------------------------------
1000 SYS M: RETURN: REM                          MEMLINK - SLAVE
1001 SYS M+7,A,B,C: RETURN: REM                  MEMLINK - SEND
1002 SYS M+11,A,B,C: RETURN: REM                 MEMLINK - GET

50000 REM----------------------------------------------------------------
50010 REM                                              MACHINE CODE LOADER
50020 PRINT"LOADING"
50030 READ H1: READ H3 :REM                            H1=START : H3=SUMCHECK
50040 M=H1: REM                                        SET START OF MEMLINK
50050 IF M>=PEEK(MH-1) +256*PEEK(MH) THEN 50110: REM   MEMORY LIMIT ALREADY OK
50060 Z=INT(M/256)
50070 POKE MH,Z: POKE MH-1,0 :REM                      RESET END OF MEMORY
50080 POKE MH-4,Z: POKE MH-5,0 :REM                    RESET START OF STRINGS
50110 READ A$: IF A$="*" THEN 50180: REM               GET BYTE AND TEST END
50120 IF LEN(A$)<>2 THEN 50200: REM                    CHECK LENGTH
50130 A=ASC(A$)-48: A=A+7*(A>9): REM                   CONVERT UPPER
50140 IF A<0 OR A>15 THEN 50200: REM                   BAD HEXADECIMAL
50150 B=ASC(RIGHT$(A$,1))-48: B=B+7*(B>9): REM         CONVERT LOWER
50160 IF B<0 OR B>15 THEN 50200: REM                   BAD HEXADECIMAL
50170 Z=16*A+B: POKE H1,Z: H1=H1+1: H2=H2+Z: GOTO 50110
50180 IF H2<>H3 THEN 50250: REM                        AT END DO SUMCHECK
50190 RETURN
50200 DL=60
50210 IF MM=65394 OR MM=65352 THEN DL=63
50220 PRINT "DATA LINE";PEEK(DL)+256*PEEK(DL+1)
50230 PRINT "?BAD BYTE"
50240 PRINT ""A$: END
50250 PRINT "SUMCHECK ERROR": END
59998 REM MACHINE CODE
59999 REM----------------------------------------------------------------
60000 DATA 32000, 42976: REM                                         BASIC2
60010 DATA A9,00,85,00,4C,38,7D,A9,4D,D0,02,A9,CD,85,00,20,35,7E,A5,12,48,A5,11
60020 DATA 48,20,35,7E,A5,12,48,A5,11,48,20,35,7E,A5,11,85,4F,A5,12,85,50,68,85
60030 DATA 4D,68,85,4E,68,85,4B,68,85,4C,A9,00,8D,4B,E8,AD,4C,E8,29,FE,8D,4C,E8
60040 DATA AD,4C,E8,09,E0,8D,4C,E8,AD,41,E8,AD,4C,E8,09,E0,8D,4C,E8,A5,00,D0,1D
60050 DATA 8D,43,E8,78,20,16,7E,A0,05,88,D0,FD,AD,4D,E8,29,02,F0,F1,AD,41,E8,58
60060 DATA A2,00,A0,06,D0,32,78,AD,4D,E8,29,02,F0,02,D0,09,AD,4D,E8,29,02,F0,F0
60070 DATA D0,00,AD,4C,E8,29,DF,8D,4C,E8,AE,41,E8,09,E0,8D,4C,E8,A9,FF,8D,43,E8
60080 DATA 58,A2,00,A0,06,D0,21,20,16,7E,20,24,7E,AD,41,E8,95,4B,E8,88,D0,F1,20
60090 DATA 16,7E,20,24,7E,AD,41,E8,C9,4D,D0,22,F0,38,20,24,7E,B5,4B,8D,41,E8,20
60100 DATA 16,7E,E8,88,D0,F1,20,24,7E,A5,00,48,8D,41,E8,20,16,7E,68,C9,4D,D0,18
60110 DATA A9,FF,8D,43,E8,A0,00,20,24,7E,B1,4B,8D,41,E8,20,16,7E,20,52,7E,90,F0
60120 DATA 60,A9,00,8D,43,E8,A0,00,20,16,7E,20,24,7E,AD,41,E8,91,4F,20,4C,7E,90
60130 DATA F0,60,AD,4C,E8,29,DF,8D,4C,E8,09,E0,8D,4C,E8,60,A5,97,C9,04,D0,03,4C
```

```
60140 DATA 89,C3,AD,4D,E8,29,02,F0,F0,60,20,F8,CD,20,9F,CC,A5,07,D0,08,A5,08,D0
60150 DATA 03,20,D2,D6,60,A2,A3,4C,57,C3,E6,4F,D0,02,E6,50,A5,4C,C5,4E,90,08,D0
60160 DATA 0C,A5,4B,C5,4D,B0,06,E6,4B,D0,02,E6,4C,60
60170 DATA *
60200 DATA 32000, 42964: REM                                          BASIC4
60210 DATA A9,00,85,00,4C,38,7D,A9,4D,D0,02,A9,CD,85,00,20,35,7E,A5,12,48,A5,11
60220 DATA 48,20,35,7E,A5,12,48,A5,11,48,20,35,7E,A5,11,85,4F,A5,12,85,50,68,85
60230 DATA 4D,68,85,4E,68,85,4B,68,85,4C,A9,00,8D,4B,E8,AD,4C,E8,29,FE,8D,4C,E8
60240 DATA AD,4C,E8,09,E0,8D,4C,E8,AD,41,E8,AD,4C,E8,09,E0,8D,4C,E8,A5,00,D0,1D
60250 DATA 8D,43,E8,78,20,16,7E,A0,05,88,D0,FD,AD,4D,E8,29,02,F0,F1,AD,41,E8,58
60260 DATA A2,00,A0,06,D0,32,78,AD,4D,E8,29,02,F0,02,D0,09,AD,4D,E8,29,02,F0,F0
60270 DATA D0,00,AD,4C,E8,29,DF,8D,4C,E8,AE,41,E8,09,E0,8D,4C,E8,A9,FF,8D,43,E8
60280 DATA 58,A2,00,A0,06,D0,21,20,16,7E,20,24,7E,AD,41,E8,95,4B,E8,88,D0,F1,20
60290 DATA 16,7E,20,24,7E,AD,41,E8,C9,4D,D0,22,F0,38,20,24,7E,B5,4B,8D,41,E8,20
60300 DATA 16,7E,E8,88,D0,F1,20,24,7E,A5,00,48,8D,41,E8,20,16,7E,68,C9,4D,D0,18
60310 DATA A9,FF,8D,43,E8,A0,00,20,24,7E,B1,4B,8D,41,E8,20,16,7E,20,52,7E,90,F0
60320 DATA 60,A9,00,8D,43,E8,A0,00,20,16,7E,20,24,7E,AD,41,E8,91,4F,20,4C,7E,90
60330 DATA F0,60,AD,4C,E8,29,DF,8D,4C,E8,09,E0,8D,4C,E8,60,A5,97,C9,04,D0,03,4C
60340 DATA FF,B3,AD,4D,E8,29,02,F0,F0,60,20,F5,BE,20,98,BD,A5,07,D0,08,A5,08,D0
60350 DATA 03,20,2D,C9,60,A2,A3,4C,CF,B3,E6,4F,D0,02,E6,50,A5,4C,C5,4E,90,08,D0
60360 DATA 0C,A5,4B,C5,4D,B0,06,E6,4B,D0,02,E6,4C,60
60370 DATA *



60400 DATA 7168, 37115: REM                                              VIC
60410 DATA A9,00,85,00,4C,38,1C,A9,4D,D0,02,A9,CD,85,00,20,35,1D,A5,15,48,A5,14
60420 DATA 48,20,35,1D,A5,15,48,A5,14,48,20,35,1D,A5,14,85,52,A5,15,85,53,68,85
60430 DATA 50,68,85,51,68,85,4E,68,85,4F,A9,00,8D,1B,91,AD,1C,91,29,EF,8D,1C,91
60440 DATA AD,1C,91,09,E0,8D,1C,91,AD,10,91,AD,1C,91,09,E0,8D,1C,91,A5,00,D0,1D
60450 DATA 8D,12,91,78,20,16,1D,A0,05,88,D0,FD,AD,1D,91,29,10,F0,F1,AD,10,91,58
60460 DATA A2,00,A0,06,D0,32,78,AD,1D,91,29,10,F0,02,D0,09,AD,1D,91,29,10,F0,F0
60470 DATA D0,00,AD,1C,91,29,DF,8D,1C,91,AE,10,91,09,E0,8D,1C,91,A9,FF,8D,12,91
60480 DATA 58,A2,00,A0,06,D0,21,20,16,1D,20,24,1D,AD,10,91,95,4E,E8,88,D0,F1,20
60490 DATA 16,1D,20,24,1D,AD,10,91,C9,4D,D0,22,F0,38,20,24,1D,B5,4E,8D,10,91,20
60500 DATA 16,1D,E8,88,D0,F1,20,24,1D,A5,00,48,8D,10,91,20,16,1D,68,C9,4D,D0,18
60510 DATA A9,FF,8D,12,91,A0,00,20,24,1D,B1,4E,8D,10,91,20,16,1D,20,52,1D,90,F0
60520 DATA 60,A9,00,8D,12,91,A0,00,20,16,1D,20,24,1D,AD,10,91,91,52,20,4C,1D,90
60530 DATA F0,60,AD,1C,91,29,DF,8D,1C,91,09,E0,8D,1C,91,60,A5,C5,C9,18,D0,03,4C
60540 DATA 74,C4,AD,1D,91,29,10,F0,F0,60,20,FD,CE,20,9E,CD,A5,0D,D0,08,A5,0E,D0
60550 DATA 03,20,F7,D7,60,A2,15,4C,3A,C4,E6,52,D0,02,E6,53,A5,4F,C5,51,90,08,D0
60560 DATA 0C,A5,4E,C5,50,B0,06,E6,4E,D0,02,E6,4F,60
60570 DATA *
60600 DATA 40448, 40909: REM                                           CBM64
60610 DATA A9,00,85,BD,4C,38,9E,A9,4D,D0,02,A9,CD,85,BD,20,35,9F,A5,15,48,A5,14
60620 DATA 48,20,35,9F,A5,15,48,A5,14,48,20,35,9F,A5,14,85,52,A5,15,85,53,68,85
60630 DATA 50,68,85,51,68,85,4E,68,85,4F,A9,00,8D,E8,07,AD,E8,07,29,00,8D,E8,07
60640 DATA AD,02,DD,09,04,8D,02,DD,AD,0D,DD,AD,00,DD,09,04,8D,00,DD,A5,BD,D0,1D
60650 DATA 8D,03,DD,78,20,16,9F,A0,05,88,D0,FD,AD,0D,DD,29,10,F0,F1,AD,0D,DD,58
60660 DATA A2,00,A0,06,D0,32,78,AD,0D,DD,29,10,F0,02,D0,09,AD,0D,DD,29,10,F0,F0
60670 DATA D0,00,AD,00,DD,29,FB,8D,00,DD,AE,0D,DD,09,04,8D,00,DD,A9,FF,8D,03,DD
60680 DATA 58,A2,00,A0,06,D0,21,20,16,9F,20,24,9F,AD,01,DD,95,4E,E8,88,D0,F1,20
60690 DATA 16,9F,20,24,9F,AD,01,DD,C9,4D,D0,22,F0,38,20,24,9F,B5,4E,8D,01,DD,20
60700 DATA 16,9F,E8,88,D0,F1,20,24,9F,A5,BD,48,8D,01,DD,20,16,9F,68,C9,4D,D0,18
60710 DATA A9,FF,8D,03,DD,A0,00,20,24,9F,B1,4E,8D,01,DD,20,16,9F,20,52,9F,90,F0
60720 DATA 60,A9,00,8D,03,DD,A0,00,20,16,9F,20,24,9F,AD,01,DD,91,52,20,4C,9F,90
60730 DATA F0,60,AD,00,DD,29,FB,8D,00,DD,09,04,8D,00,DD,60,A5,C5,C9,3F,D0,03,4C
60740 DATA 74,A4,AD,0D,DD,29,10,F0,F0,60,20,FD,AE,20,9E,AD,A5,0D,D0,08,A5,0E,D0
60750 DATA 03,20,F7,B7,60,A2,15,4C,3A,A4,E6,52,D0,02,E6,53,A5,4F,C5,51,90,08,D0
60760 DATA 0C,A5,4E,C5,50,B0,06,E6,4E,D0,02,E6,4F,60
60770 DATA *
```

```
10 REM                 VARLINK                         W.OWEN MURCOTT NOV 1983
11 REM------------------------------------------------------------------------
20 REM                                                  MM=MACHINE TYPE
21 REM                                                  MH=END MEMORY POINTER
29 REM------------------------------------------------------------------------
50 MM=PEEK(65534)+256*PEEK(65535): REM                     DETECT MACHINE TYPE
60 IF MM=58907 THEN MH=53: GOTO 100: REM                            ... BASIC2
61 IF MM=58434 THEN MH=53: GOTO 90: REM                             ... BASIC4
62 IF MM=65394 THEN MH=56: GOTO 80: REM                             ... VIC
63 IF MM=65352 THEN MH=56: GOTO 70: REM                             ... CBM64
64 PRINT "MACHINE NOT KNOWN": END
65 :
69 REM------------------------------------------------------------------------
70 READ Z$: IF Z$<>"*" THEN 70: REM               SKIP CODE FOR OTHER MACHINES
80 READ Z$: IF Z$<>"*" THEN 80
90 READ Z$: IF Z$<>"*" THEN 90
99 :
100 Z$="": GOSUB 50000: REM                       LOAD VARLINK CODE
101 END
50000 REM---------------------------------------------------------------------
50010 REM                                               MACHINE CODE LOADER
50020 PRINT"LOADING"
50030 READ H1: READ H3 :REM                             H1=START : H3=SUMCHECK
50040 M=H1: REM                                         SET START OF MEMLINK
50050 IF M>=PEEK(MH-1) +256*PEEK(MH) THEN 50110: REM    MEMORY LIMIT ALREADY OK
50060 Z=INT(M/256)
50070 POKE MH,Z: POKE MH-1,0 :REM                       RESET END OF MEMORY
50080 POKE MH-4,Z: POKE MH-5,0 :REM                     RESET START OF STRINGS
50110 READ A$: IF A$="*" THEN 50180: REM                GET BYTE AND TEST END
50120 IF LEN(A$)<>2 THEN 50200: REM                     CHECK LENGTH
50130 A=ASC(A$)-48: A=A+7*(A>9): REM                    CONVERT UPPER
50140 IF A<0 OR A>15 THEN 50200: REM                    BAD HEXADECIMAL
50150 B=ASC(RIGHT$(A$,1))-48: B=B+7*(B>9): REM          CONVERT LOWER
50160 IF B<0 OR B>15 THEN 50200: REM                    BAD HEXADECIMAL
50170 Z=16*A+B: POKE H1,Z: H1=H1+1: H2=H2+Z: GOTO 50110
50180 IF H2<>H3 THEN 50250: REM                         AT END DO SUMCHECK
50190 RETURN
50200 DL=60
50210 IF MM=65394 OR MM=65352 THEN DL=63
50220 PRINT "DATA LINE";PEEK(DL)+256*PEEK(DL+1)
50230 PRINT "[D]?BAD BYTE"
50240 PRINT "[D][RVS]"A$: END
50250 PRINT "[D]SUMCHECK ERROR": END


59998 REM                                                                                 MACHINE CODE
59999 REM------------------------------------------------------------------------------------------------
60000 DATA 31488, 61161: REM                                                                        BASIC2
60010 DATA A9,00,85,00,4C,19,7B,A9,56,D0,02,A9,D6,85,00,20,F8,CD,20,6D,CF,85,46
60020 DATA 84,47,A9,00,8D,4B,E8,AD,4C,E8,29,FE,8D,4C,E8,AD,4C,E8,09,E0,8D,4C,E8
60030 DATA AD,41,E8,AD,4C,E8,09,E0,8D,4C,E8,78,A5,00,D0,19,8D,43,E8,20,BB,7C,A0
60040 DATA 05,88,D0,FD,AD,4D,E8,29,02,F0,F1,AD,41,E8,58,4C,82,7B,AD,4D,E8,29,02
60050 DATA F0,02,D0,09,AD,4D,E8,29,02,F0,F0,D0,00,AD,4C,E8,29,DF,8D,4C,E8,AE,41
60060 DATA E8,09,E0,8D,4C,E8,A9,FF,8D,43,E8,58,4C,BB,7B,20,CC,7C,AD,41,E8,48,20
60070 DATA C9,7C,AD,41,E8,85,07,20,C9,7C,AD,41,E8,85,08,20,C9,7C,AD,41,E8,85,42
60080 DATA 20,C9,7C,AD,41,E8,85,43,A9,00,85,06,20,C9,CF,85,46,84,47,68,C9,56,D0
60090 DATA 30,F0,6C,A5,00,8D,41,E8,20,C9,7C,A5,07,8D,41,E8,20,C9,7C,A5,08,8D,41
60100 DATA E8,20,C9,7C,A5,42,8D,41,E8,20,C9,7C,A5,43,8D,41,E8,20,BB,7C,A5,00,C9
60110 DATA 56,D0,3E,A9,FF,8D,43,E8,A5,07,D0,09,A2,05,20,EA,7C,A0,00,F0,0F,A0,02
60120 DATA B1,44,85,20,88,B1,44,85,1F,88,B1,44,AA,20,CC,7C,8E,41,E8,20,BB,7C,E0
60130 DATA 00,F0,0F,20,CC,7C,B1,1F,8D,41,E8,20,BB,7C,C8,CA,D0,F1,60,A9,00,8D,43
60140 DATA E8,20,C9,7C,AE,41,E8,A0,00,A5,07,D0,07,20,EA,7C,20,DD,7C,60,86,1F,38
60150 DATA A5,30,E5,1F,85,30,A5,31,E9,00,85,31,38,A5,30,E9,02,85,30,85,32,85,1F
```

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60160 DATA 85,40,A5,31,E9,00,85,31,85,33,85,20,85,41,C5,2F,90,0A,D0,0B,A5,30,C5
60170 DATA 2E,90,02,D0,03,4C,55,C3,E0,00,F0,03,20,DD,7C,98,18,65,1F,85,1F,90,02
60180 DATA E6,20,A0,00,A9,2C,91,1F,85,04,A9,3A,85,03,A9,98,85,0B,A5,77,A4,78,85
60190 DATA 48,84,49,A5,40,A4,41,85,77,84,78,20,67,D3,20,BD,D6,20,E2,C8,A5,48,A4
60200 DATA 49,85,77,84,78,60,AD,4C,E8,29,DF,8D,4C,E8,09,E0,8D,4C,E8,60,20,BB,7C
60210 DATA A5,97,C9,04,D0,03,4C,89,C3,AD,4D,E8,29,02,F0,F0,60,20,C9,7C,AD,41,E8
60220 DATA 91,1F,C8,CA,D0,F4,60,A5,44,85,1F,A5,45,85,20,60
60230 DATA *
60300 DATA 31488, 60936: REM
                                                                          BASIC4
60310 DATA A9,00,85,00,4C,19,7B,A9,56,D0,02,A9,D6,85,00,20,F5,BE,20,2B,C1,85,46
60320 DATA 84,47,A9,00,8D,4B,E8,AD,4C,E8,29,FE,8D,4C,E8,AD,4C,E8,09,E0,8D,4C,E8
60330 DATA AD,41,E8,AD,4C,E8,09,E0,8D,4C,E8,78,A5,00,D0,19,8D,43,E8,20,BB,7C,A0
60340 DATA 05,88,D0,FD,AD,4D,E8,29,02,F0,F1,AD,41,E8,58,4C,82,7B,AD,4D,E8,29,02
60350 DATA F0,02,D0,09,AD,4D,E8,29,02,F0,F0,D0,00,AD,4C,E8,29,DF,8D,4C,E8,AE,41
60360 DATA E8,09,E0,8D,4C,E8,A9,FF,8D,43,E8,58,4C,BB,7B,20,CC,7C,AD,41,E8,48,20
60370 DATA C9,7C,AD,41,E8,85,07,20,C9,7C,AD,41,E8,85,08,20,C9,7C,AD,41,E8,85,42
60380 DATA 20,C9,7C,AD,41,E8,85,43,A9,00,85,06,20,87,C1,85,46,84,47,68,C9,56,D0
60390 DATA 30,F0,6C,A5,00,8D,41,E8,20,C9,7C,A5,07,8D,41,E8,20,C9,7C,A5,08,8D,41
60400 DATA E8,20,C9,7C,A5,42,8D,41,E8,20,C9,7C,A5,43,8D,41,E8,20,BB,7C,A5,00,C9
60410 DATA 56,D0,3E,A9,FF,8D,43,E8,A5,07,D0,09,A2,05,20,EA,7C,A0,00,F0,0F,A0,02
60420 DATA B1,44,85,20,88,B1,44,85,1F,88,B1,44,AA,20,CC,7C,8E,41,E8,20,BB,7C,E0
60430 DATA 00,F0,0F,20,CC,7C,B1,1F,8D,41,E8,20,BB,7C,C8,CA,D0,F1,60,A9,00,8D,43
60440 DATA E8,20,C9,7C,AE,41,E8,A0,00,A5,07,D0,07,20,EA,7C,20,DD,7C,60,86,1F,38
60450 DATA A5,30,E5,1F,85,30,A5,31,E9,00,85,31,38,A5,30,E9,02,85,30,85,32,85,1F
60460 DATA 85,40,A5,31,E9,00,85,31,85,33,85,20,85,41,C5,2F,90,0A,D0,0B,A5,30,C5
60470 DATA 2E,90,02,D0,03,4C,CD,B3,E0,00,F0,03,20,DD,7C,98,18,65,1F,85,1F,90,02
60480 DATA E6,20,A0,00,A9,2C,91,1F,85,04,A9,3A,85,03,A9,98,85,0B,A5,77,A4,78,85
60490 DATA 48,84,49,A5,40,A4,41,85,77,84,78,20,B6,C5,20,18,C9,20,65,B9,A5,48,A4
60500 DATA 49,85,77,84,78,60,AD,4C,E8,29,DF,8D,4C,E8,09,E0,8D,4C,E8,60,20,BB,7C
60510 DATA A5,97,C9,04,D0,03,4C,FF,B3,AD,4D,E8,29,02,F0,F0,60,20,C9,7C,AD,41,E8
60520 DATA 91,1F,C8,CA,D0,F4,60,A5,44,85,1F,A5,45,85,20,60
60530 DATA *
60600 DATA 6656, 53997: REM
                                                                             VIC
60610 DATA A9,00,85,00,4C,19,1A,A9,56,D0,02,A9,D6,85,00,20,FD,CE,20,8B,D0,85,49
60620 DATA 84,4A,A9,00,8D,1B,91,AD,1C,91,29,EF,8D,1C,91,AD,1C,91,09,E0,8D,1C,91
60630 DATA AD,10,91,AD,1C,91,09,E0,8D,1C,91,78,A5,00,D0,19,8D,12,91,20,BB,1B,A0
60640 DATA 05,88,D0,FD,AD,1D,91,29,10,F0,F1,AD,10,91,58,4C,82,1A,AD,1D,91,29,10
60650 DATA F0,02,D0,09,AD,1D,91,29,10,F0,F0,D0,00,AD,1C,91,29,DF,8D,1C,91,AE,10
60660 DATA 91,09,E0,8D,1C,91,A9,FF,8D,12,91,58,4C,BB,1A,20,CC,1B,AD,10,91,48,20
60670 DATA C9,1B,AD,10,91,85,0D,20,C9,1B,AD,10,91,85,0E,20,C9,1B,AD,10,91,85,45
60680 DATA 20,C9,1B,AD,10,91,85,46,A9,00,85,0C,20,E7,D0,85,49,84,4A,68,C9,56,D0
60690 DATA 30,F0,6C,A5,00,8D,10,91,20,C9,1B,A5,0D,8D,10,91,20,C9,1B,A5,0E,8D,10
60700 DATA 91,20,C9,1B,A5,45,8D,10,91,20,C9,1B,A5,46,8D,10,91,20,BB,1B,A5,00,C9
60710 DATA 56,D0,3E,A9,FF,8D,12,91,A5,0D,D0,09,A2,05,20,EA,1B,A0,00,F0,0F,A0,02
60720 DATA B1,47,85,23,88,B1,47,85,22,88,B1,47,AA,20,CC,1B,8E,10,91,20,BB,1B,E0
60730 DATA 00,F0,0F,20,CC,1B,B1,22,8D,10,91,20,BB,1B,C8,CA,D0,F1,60,A9,00,8D,12
60740 DATA 91,20,C9,1B,AE,10,91,A0,00,A5,0D,D0,07,20,EA,1B,20,DD,1B,60,86,22,38
60750 DATA A5,33,E5,22,85,33,A5,34,E9,00,85,34,38,A5,33,E9,02,85,33,85,35,85,22
60760 DATA 85,43,A5,34,E9,00,85,34,85,36,85,23,85,44,C5,32,90,0A,D0,0B,A5,33,C5
60770 DATA 31,90,02,D0,03,4C,35,C4,E0,00,F0,03,20,DD,1B,98,18,65,22,85,22,90,02
60780 DATA E6,23,A0,00,A9,2C,91,22,85,08,A9,3A,85,07,A9,98,85,11,A5,7A,A4,7B,85
60790 DATA 4B,84,4C,A5,43,A4,44,85,7A,84,7B,20,8D,D4,20,E2,D7,20,DA,C9,A5,4B,A4
60800 DATA 4C,85,7A,84,7B,60,AD,1C,91,29,DF,8D,1C,91,09,E0,8D,1C,91,60,20,BB,1B
60810 DATA A5,C5,C9,18,D0,03,4C,74,C4,AD,1D,91,29,10,F0,F0,60,20,C9,1B,AD,10,91
60820 DATA 91,22,C8,CA,D0,F4,60,A5,47,85,22,A5,48,85,23,60
60830 DATA *
60900 DATA 39936, 59152: REM
                                                                           CBM64
60910 DATA A9,00,85,BD,4C,19,9C,A9,56,D0,02,A9,D6,85,BD,20,FD,AE,20,8B,B0,85,49
60920 DATA 84,4A,A9,00,8D,E8,07,AD,E8,07,29,00,8D,E8,07,AD,02,DD,09,04,8D,02,DD
60930 DATA AD,0D,DD,AD,00,DD,09,04,8D,00,DD,78,A5,BD,D0,19,8D,03,DD,20,BB,9D,A0
60940 DATA 05,88,D0,FD,AD,0D,DD,29,10,F0,F1,AD,0D,DD,58,4C,82,9C,AD,0D,DD,29,10
60950 DATA F0,02,D0,09,AD,0D,DD,29,10,F0,F0,D0,00,AD,00,DD,29,FB,8D,00,DD,AE,0D
60960 DATA DD,09,04,8D,00,DD,A9,FF,8D,03,DD,58,4C,BB,9C,20,CC,9D,AD,01,DD,48,20
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60970 DATA C9,9D,AD,01,DD,85,0D,20,C9,9D,AD,01,DD,85,0E,20,C9,9D,AD,01,DD,85,45
60980 DATA 20,C9,9D,AD,01,DD,85,46,A9,00,85,0C,20,E7,B0,85,49,84,4A,68,C9,56,D0
60990 DATA 30,F0,6C,A5,BD,8D,01,DD,20,C9,9D,A5,0D,8D,01,DD,20,C9,9D,A5,0E,8D,01
61000 DATA DD,20,C9,9D,A5,45,8D,01,DD,20,C9,9D,A5,46,8D,01,DD,20,BB,9D,A5,BD,C9
61010 DATA 56,D0,3E,A9,FF,8D,03,DD,A5,0D,D0,09,A2,05,20,EA,9D,A0,00,F0,0F,A0,02
61020 DATA B1,47,85,23,88,B1,47,85,22,88,B1,47,AA,20;CC,9D,8E,01,DD,20,BB,9D,E0
61030 DATA 00,F0,0F,20,CC,9D,B1,22,8D,01,DD,20,BB,9D,C8,CA,D0,F1,60,A9,00,8D,03
61040 DATA DD,20,C9,9D,AE,01,DD,A0,00,A5,0D,D0,07,20,EA,9D,20,DD,9D,60,86,22,38
61050 DATA A5,33,E5,22,85,33,A5,34,E9,00,85,34,38,A5,33,E9,02,85,33,85,35,85,22
61060 DATA 85,43,A5,34,E9,00,85,34,85,36,85,23,85,44,C5,32,90,0A,D0,0B,A5,33,C5
61070 DATA 31,90,02,D0,03,4C,35,A4,E0,00,F0,03,20,DD,9D,98,18,65,22,85,22,90,02
61080 DATA E6,23,A0,00,A9,2C,91,22,85,08,A9,3A,85,07,A9,98,85,11,A5,7A,A4,7B,85
61090 DATA 4B,84,4C,A5,43,A4,44,85,7A,84,7B,20,8D,B4,20,E2,B7,20,DA,A9,A5,4B,A4
61100 DATA 4C,85,7A,84,7B,60,AD,00,DD,29,FB,8D,00,DD,09,04,8D,00,DD,60,20,BB,9D
61110 DATA A5,C5,C9,3F,D0,03,4C,74,A4,AD,0D,DD,29,10,F0,F0,60,20,C9,9D,AD,01,DD
61120 DATA 91,22,C8,CA,D0,F4,60,A5,47,85,22,A5,48,85,23,60
61130 DATA *
```

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500 problems

Dear Sir,
With reference to the letter about the CBM 500 in your November issue.

Like your correspondent, Mr Moseley, I was the owner of a CBM 500 (serial number 0020), but as I work in the computer industry, I have an advantage over Mr Moseley. From this inside knowledge I can add valuable information for your readers and any other CBM 500 owners.

I generally agree with Mr Moseley – it is a machine that works reasonably well. It is also cheap for what it can do. I am frankly surprised that Commodore have withdrawn it. My experiences are perhaps best documented in diary form as follows:

November 1982; Ordered machine
March 1983; CBM 500 shown at local dealer exhibitions.
Mid March; Dealer notifies me machine is available.
Purchase machine plus peripherals.
Mid April; Computer trade press announces withdrawal of 500. Purchasers offered refund or exchange. Contact Commodore for details.
May; No response. I contact company again.
June; Still no response. I write to general manager. Reply confirms offer.
July; Exchange of correspondence with general manager's secretary to obtain details. Continue to use machine and develop software.
August; Reports in press that project to develop replacement for 500 is scrapped. Cease use of machine. Write requesting refund. Commodore agree and gives instructions about returning hardware.
September; Hardware returned via dealer.
October; Dealer expected to refund whole purchase price but Commodore only willing to refund dealer his purchase price. Dealer unwilling to cooperate. Write Commodore. No reply. Phone and telex. No joy.
November; Seek legal advice. Write Commodore recorded delivery letter as last chance before legal action. See letter in Commodore Computing International.

That's the story so far and I will let you know the outcome of the final letter.

I have developed the following software for the 500 using CBM Basic 4.0: CBM Basic conversion to text, text editor, text to CBM Basic conversion, Basic text utilities (eg Renumber), Basic Library management and program build software. I was evaluating design options for the 6502 Assembler when I eventually gave up.

As no other suitable machine exists for replacement I am currently attempting to sell the diskettes and disk safe. The software is intact in CBM 8050 format. If Mr Moseley wants to keep his machine and wants the software free he can have it for the price of the diskettes (£20 for 10 Datalife disks) As I no longer have the 500 or disk drive I cannot copy the software for distribution.

I hope this helps Mr Moseley and other readers.

Nigel Clark,
Chesham,
Bucks.

This is the only letter we have received complaining about problems with refunds on the 500. We hope it is the only one. It does, however, illustrate problems that many people have when dealing with the computer industry in general.

We have also heard from a lady who bought two cartridges as a Christmas present only to find that recipient had already acquired the same two cartridges. When she returned them she found that the price had been reduced and that she could only obtain a refund at the reduced price.

This may be legally correct, but seems blatantly unfair– as does the refusal of Mr Clark's dealer to refund the full price.

The computer business must wake up to the fact that people are no longer so overawed by computers that the will accept below standard service or products!

If any other readers have problems with the 500, we would be delighted to forward their name and address to Mr Clark.

We have received a request from the United Arab Emirates for a flexible payroll package for use on a CBM 8096 with 8050 disk drive and Centronics 151 printer (up to 132 characters per line).

David Stokes of Alico points out that his company has three departments with up to ten rates of pay for each employee. Deductions from pay are minimal – no health or medical insurance, no pension schemes and no tax! But he requests that there should be provision to deduct loans repayments, telephone/telex charges and fines imposed for absence without valid reason!

All payments are in cash so an automatic coin analysis is essential. Printed output should summarise the input, reflecting number of hours worked and rates of pay accordingly, deductions and nett pay.

Mr Stokes can be contacted at Alico, PO Box 6011, Sharjah, United Arab Emirates.

In our Vol 2 No 7 issue the telephone number for Understanding Ltd was wrong. The correct number is 01-450 1144.

Reader Service

We welcome letters and queries for publication on this page. We would ask readers, however, not to send stamped address envelopes for replies. Much as we would like to answer all letters personally we regret are unable to do so. We will do our best to answer all letters and queries on this page.

Please make letters short and to the point. The editor reserves the right to edit letters where necessary.
The address to write to is:

QUERIES, Commodore Computing International,
167-169 Great Portland Street, London W1.

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Using dedicated memory configurations, the extended Basic with built in assembler uses 14K RAM and 8K Video RAM, but it still leaves approx 37K (1K less than when switched on), available for the user, even in hi-res mode.
(Commodore's version only leaves 24K in hi-res mode). As standard, all keywords are correctly tokenised to save program space and speed of excution.

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Basic aids for the 64

In past issues of Commodore Computing International, we have published Basic aids for both the VIC-20 and the PET series. In the next few months we will be producing similar routines for the 64. When enough routines have been produced, we will put them all together to make up a Basic Aid for the 64. We start with a delete routine.

```
10 I=49243:T=0
20 READA:IFA=-1THEN50
30 POKEI,A:I=I+1
40 T=T+A:GOTO20
50 IFT<>20549THENPRINT"▓CHECKSUM ERROR:20549",T:ER=1
60 IFI>49409THENPRINT"▓TOO MANY DATA VALUES":ER=1
70 IFI<49409THENPRINT"▓NOT ENOUGH DATA VALUES":ER=1
80 IFER=1THENEND
90 PRINT"▓▓TO DELETE LINES ENTER SYS49243,L1-L2":END
100 DATA32,191,192,165,95,166,96
110 DATA133,251,134,252,32,19,166
120 DATA165,95,166,96,144,10,160
130 DATA1,177,95,240,4,170,136
140 DATA177,95,133,122,134,123,165
150 DATA251,56,229,122,170,165,252
160 DATA229,123,168,176,30,138,24
170 DATA101,45,133,45,152,101,46
180 DATA133,46,160,0,177,122,145
190 DATA251,200,208,249,230,123,230
200 DATA252,165,46,197,252,176,239
210 DATA32,51,165,165,34,166,35
220 DATA24,105,2,133,45,144,1
230 DATA232,134,46,32,89,166,76
240 DATA116,164,32,253,174,32,121
250 DATA0,144,22,240,14,201,171
260 DATA208,10,169,1,133,95,169
270 DATA8,133,96,208,21,76,8
280 DATA175,234,234,234,32,107,169
290 DATA32,19,166,32,121,0,240
300 DATA12,201,171,208,235,32,115
310 DATA0,32,107,169,208,227,165
320 DATA20,5,21,208,6,169,255
330 DATA133,20,133,21,96,-1
READY.
```

Last month we produced a routine to append one program on to the end of another. This month we take a look at the delete command, a very useful routine which will delete a block of lines specified in the call, in the same format as the list command.

To call this routine, enter SYS49243, 11-12. This will delete the lines within the range of 11 and 12. Other combinations of this call can be used to delete up to a certain line, from a line to the end or just one line.

The routine is nearly relocatable with just two byte changes required. The second and third numbers on the first data line are the low and high bytes of a subroutine called within the routine. If you require the routine in a different area, just change these numbers relative to the present number.

```
READY.

 0  C05B  20BFC0    JSR  $C0BF
 1  C05E  A55F      LDA  $5F
 2  C060  A660      LDX  $60
 3  C062  85FB      STA  $FB
 4  C064  86FC      STX  $FC
 5  C066  2013A6    JSR  $A613
 6  C069  A55F      LDA  $5F
 7  C06B  A660      LDX  $60
 8  C06D  900A      BCC  $C079
 9  C06F  A001      LDY  #$01
10  C071  B15F      LDA  ($5F),Y
11  C073  F004      BEQ  $C079
12  C075  AA        TAX
13  C076  88        DEY
14  C077  B15F      LDA  ($5F),Y
15  C079  857A      STA  $7A
16  C07B  867B      STX  $7B
17  C07D  A5FB      LDA  $FB
18  C07F  38        SEC
19  C080  E57A      SBC  $7A
20  C082  AA        TAX
21  C083  A5FC      LDA  $FC
22  C085  E57B      SBC  $7B
23  C087  A8        TAY
24  C088  B01E      BCS  $C0A8
25  C08A  8A        TXA
26  C08B  18        CLC
27  C08C  652D      ADC  $2D
28  C08E  852D      STA  $2D
29  C090  98        TYA
30  C091  652E      ADC  $2E
31  C093  852E      STA  $2E
32  C095  A000      LDY  #$00
33  C097  B17A      LDA  ($7A),Y
34  C099  91FB      STA  ($FB),Y
35  C09B  C8        INY
36  C09C  D0F9      BNE  $C097
37  C09E  E67B      INC  $7B
38  C0A0  E6FC      INC  $FC
39  C0A2  A52E      LDA  $2E
40  C0A4  C5FC      CMP  $FC
41  C0A6  B0EF      BCS  $C097
42  C0A8  2033A5    JSR  $A533
43  C0AB  A522      LDA  $22
44  C0AD  A623      LDX  $23
45  C0AF  18        CLC
46  C0B0  6902      ADC  #$02
47  C0B2  852D      STA  $2D
48  C0B4  9001      BCC  $C0B7
49  C0B6  E8        INX
50  C0B7  862E      STX  $2E
51  C0B9  2059A6    JSR  $A659
52  C0BC  4C74A4    JMP  $A474
53  C0BF  20FDAE    JSR  $AEFD
54  C0C2  207900    JSR  $0079
55  C0C5  9016      BCC  $C0DD
56  C0C7  F00E      BEQ  $C0D7
57  C0C9  C9AB      CMP  #$AB
58  C0CB  D00A      BNE  $C0D7
59  C0CD  A901      LDA  #$01
60  C0CF  853F      STA  $5F
61  C0D1  A908      LDA  #$08
62  C0D3  8560      STA  $60
63  C0D5  D015      BNE  $C0EC
64  C0D7  4C08AF    JMP  $AF08
65  C0DA  EA        NOP
66  C0DB  EA        NOP
67  C0DC  EA        NOP
68  C0DD  206BA9    JSR  $A96B
69  C0E0  2013A6    JSR  $A613
70  C0E3  207900    JSR  $0079
71  C0E6  F00C      BEQ  $C0F4
72  C0E8  C9AB      CMP  #$AB
73  C0EA  D0EB      BNE  $C0D7
74  C0EC  207300    JSR  $0073
75  C0EF  206BA9    JSR  $A96B
76  C0F2  D0E3      BNE  $C0D7
77  C0F4  A514      LDA  $14
78  C0F6  0515      ORA  $15
79  C0F8  D006      BNE  $C100
80  C0FA  A9FF      LDA  #$FF
81  C0FC  8514      STA  $14
82  C0FE  8515      STA  $15
83  C100  60        RTS
READY.
```

HINTS AND TIPS

Disable Run/STOP-Restore.

In a past issue, we published in our hints and tips section a poke that would disable the above. This, we found later, did not work 100%. Following is a routine for the 64 that has two calls. The first is to disable the above and the second is to re-enable. This is a completely safe routine that will do just what is expected and no more.

To disable: SYS49409.
To re-enable: SYS49425.

```
10 I=49409:T=0
20 READA:IFA=-1THEN50
30 POKEI,A:I=I+1
40 T=T+A:GOTO20
50 IFT<>3118THENPRINT"□CHECKSUM ERROR":END
60 PRINT"□SYS 49409 DISABLES STOP/RESTORE"
70 PRINT"▩▩▩SYS 49425 RE-ENABES ABOVE"
80 END
100 DATA120,169,14,141,40,3,169
110 DATA193,141,41,3,88,96,165
120 DATA145,96,120,169,237,141,40
130 DATA3,169,246,141,41,3,88
140 DATA96,-1
READY.
```

```
   0  C101  78        SEI
   1  C102  A90E      LDA  #$0E
   2  C104  8D2803    STA  $0328
   3  C107  A9C1      LDA  #$C1
   4  C109  8D2903    STA  $0329
   5  C10C  58        CLI
   6  C10D  60        RTS
   7  C10E  A591      LDA  $91
   8  C110  60        RTS
   9  C111  78        SEI
  10  C112  A9ED      LDA  #$ED
  11  C114  8D2803    STA  $0328
  12  C117  A9F6      LDA  #$F6
  13  C119  8D2903    STA  $0329
  14  C11C  58        CLI
  15  C11D  60        RTS
READY.
```

Cold Starts

A very useful kernal routine to know is the cold start routine. This routine resets all vectors and news the program. The thing to note is that whereas when turning your machine off and on, all memory is cleared. With the cold start routine, any Basic program is newed but machine code routines will stay in memory.

The equivalent routines for the Commodore machines are as follows:

64 64738 ($FCE2)
VIC 64802 ($FD22)
PET (4) 64790 ($FD16)
PET (2) 64721 ($FCD1)

Another way to find the cold start on any 6502 computer is to do the following:

PRINT
PEEK(65532)+PEEK(65533)*25

For example; on the BBC, the equivalent code would give the cold start as 55757 (which is correct).

SID Frequency calculation

When sending a value to the SID chip for playing, the value can be anywhere between 0 and 65535. This number must be split into two parts (low and high bytes) before being sent. The most used splitting routine is as follows:

F1=INT(FQ/256): REM HI BYTE
F2=FQ-F1*256: REM LO BYTE

The calculation of F2 can also be got by:

F2=FQAND255

This works fine until FQ is greater than the largest integer possible (32767). If FQ becomes greater than 32767, the second calculation of F2 will give an illegal quantity error but the first calculation (which is slower) will still work.

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FIVE CONTROL COMMANDS

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DISPLAY – displays your assembler program
STOP – stop current operation
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You enter start and finish address, and that section of memory will be dis-assembled in full 6510/6502 mnemonics. Use dis-assembler to examine any of the 450 routines that make up the Basic Interpreter and Operating system.

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More about Charget

Last month we took a look at the charget routine for the Commodore models. In this month's section we will take a look at how the charget routine can be used to modify some of the Basic routines.

Because the 64 is the only machine that really facilitates the modification of routines without the need for some sort of wedge into charget, the routines that follow are for this machine.

The method used is to copy the Basic ROM into the RAM behind and alter the vectors to the commands to go to routines that are in the $C000 area of RAM.

In this way, we have made a few changes to the 64's Basic. RESTORE has had an optional line number added, PRINT and INPUT now allow the '@' symbol followed by a y and x position to allow PRINT at and INPUT at. LOAD, SAVE, and VERIFY have been modified so that disk users do not have to type ,8 at the end of the command i.e. the default device number has been set to 8. The last modification is to add a '!' character if needed to the poke command so that a two byte poke has been enabled. All of these modifications will now be explained in more detail.

$C000-$C02A Copies the Basic ROM into the RAM behind it, switches out the Basic ROM and copies the new command vectors into the locations in the Basic area.

$C02D-$C072 This is the new keyword vectors area. The routines that have been changed have had their corresponding vectors altered to point to the new routines following. The vectors are stored in low-high order and point to the byte before the actual routine.

$C073-$C079 The start of the new SAVE routine.

$C07C-$C089 The start of the new VERIFY routine.

$C07D Entry point for the new LOAD routine.

$C08C-$C098 Routine to set the default device number to 8.

$C099-$C0B4 Extension of the first routine. This routine displays a message and is also used as a command to give the amount of free RAM for programming. The command MEM has been given to replace the useless command of LET.

$C0B7-$C0F4 Message.

$C0F5-$C10E End of the power up message. This changes the screen colour, and changes the command LET to MEM.

None of the above routines actually use the charget routine but the rest do.

$C111-$C180 This is the new restore command. It is in fact the restore to line number routine published a couple of months back but now it is used in conjunction with the original restore. An optional line number can be added to the restore command and is checked for at location $C114. The JSR $0079 checks the character in the input buffer. If the carry is clear (BCC) then there is a number following and the number is read in and restore is operated. Otherwise the operation goes back to the normal restore command.

Use as: RESTORE????? where ????? is a line number. RESTORE on it's own will work to restore to the beginning of memory.

$C183-$C190 The new PRINT command. The next character after the print token is checked to see if it is a '@' character and if so, the cursor is positioned and it continues with the normal print command. Print will still work as normal.

Use as: PRINT@12,18,"hello" which will print "hello" in the middle of the screen. $C193-$C1CD Positions the cursor for print and input.

$C1CE-$C1DB Is the new INPUT routine. It works the same as the PRINT@ command eg. INPUT@ 12,18,-"command:";A$

$C1DE-$C20D The last of the routines available here is a two byte POKE command which, like the print and input, check the next character after the token. If this character is a '!' character then the new routine is used otherwise the original POKE command is used as normal.

Use as: POKE!55,32768 will set the top of basic to 32768. The equivalent use (which can still be done) is POKE55,0;POKE56,128.

Copy and change

```
READY.

 CALL @ 814B

  ADDR IRQ  SR AC XR YR SP
.; 814B EA31 4D 00 3A 9D FA
.
    0  C000  A9A0      LDA  #$A0
    1  C002  85FC      STA  $FC
    2  C004  A900      LDA  #$00
    3  C006  85FB      STA  $FB
    4  C008  A000      LDY  #$00
    5  C00A  B1FB      LDA  ($FB),Y
    6  C00C  91FB      STA  ($FB),Y
    7  C00E  C8        INY
    8  C00F  D0F9      BNE  $C00A
    9  C011  E6FC      INC  $FC
   10  C013  A5FC      LDA  $FC
   11  C015  C9C0      CMP  #$C0
   12  C017  D0EF      BNE  $C008
   13  C019  A501      LDA  $01
   14  C01B  29FE      AND  #$FE
   15  C01D  8501      STA  $01
   16  C01F  A246      LDX  #$46
   17  C021  BD2CC0    LDA  $C02C,X
   18  C024  9D0BA0    STA  $A00B,X
 19   C027  CA           DEX
 20   C028  D0F7         BNE   $C021
 21   C02A  4C99C0       JMP   $C099
.?
```

New Basic routine vectors

```
.
.: C02D 30 A8 41 A7 1D AD F7 A8
.: C035 A4 AB CD C1 80 B0 05 AC
.: C03D 98 C0 9F A8 70 A8 27 A9
.: C045 10 C1 82 A8 D1 A8 3A A9
.: C04D 2E A8 4A A9 2C B8 7E C0
.: C055 72 C0 7B C0 B2 B3 DD C1
.: C05D 7F AA 82 C1 56 A8 9B A6
.: C065 5D A6 85 AA 29 E1 BD E1
.: C06D C6 E1 7A AB 41 A6 20 8C
.?
```

SAVE

```
.
  0   C073  208CC0       JSR   $C08C
  1   C076  20E0E1       JSR   $E1E0
  2   C079  4C59E1       JMP   $E159
.?
```

VERIFY/LOAD

```
.
  0   C07C  A901         LDA   #$01
  1   C07E  2CA900       BIT   $00A9
  2   C081  850A         STA   $0A
  3   C083  208CC0       JSR   $C08C
  4   C086  20E0E1       JSR   $E1E0
  5   C089  4C6FE1       JMP   $E16F
.?
```

Get parameters for above and set default

```
.
  0   C08C  A900         LDA   #$00
  1   C08E  20BDFF       JSR   $FFBD
  2   C091  A208         LDX   #$08
  3   C093  A000         LDY   #$00
  4   C095  20BAFF       JSR   $FFBA
  5   C098  60           RTS
.?
```

New command MEM

```
.
  0   C099  A9B7         LDA   #$B7
  1   C09B  A0C0         LDY   #$C0
  2   C09D  201EAB       JSR   $AB1E
  3   C0A0  A537         LDA   $37
  4   C0A2  38           SEC
  5   C0A3  E52D         SBC   $2D
  6   C0A5  AA           TAX
  7   C0A6  A538         LDA   $38
  8   C0A8  E52E         SBC   $2E
  9   C0AA  20CDBD       JSR   $BDCD
 10   C0AD  A960         LDA   #$60
 11   C0AF  A0E4         LDY   #$E4
 12   C0B1  201EAB       JSR   $AB1E
 13   C0B4  4CF5C0       JMP   $C0F5
.?
```

Message

```
.
.: C0B7 93 11 20 20 20 05 2A 2A
.: C0BF 2A 2A 20 52 2E 20 46 52
.: C0C7 41 4E 4B 4C 49 4E 20 20
.: C0CF 42 41 53 49 43 20 56 32
.: C0D7 2E 31 20 2A 2A 2A 2A 20
.: C0DF 20 20 20 20 11 36 34 4B
.: C0E7 20 52 41 4D 20 53 59 53
.: C0EF 54 45 4D 20 20 00 A9 02
.?
```

Change colours

```
.
  0   C0F5  A902         LDA   #$02
  1   C0F7  8D21D0       STA   $D021
  2   C0FA  A904         LDA   #$04
  3   C0FC  8D20D0       STA   $D020
  4   C0FF  A94D         LDA   #$4D
  5   C101  8DBEA0       STA   $A0BE
  6   C104  A945         LDA   #$45
  7   C106  8DBFA0       STA   $A0BF
  8   C109  A9CD         LDA   #$CD
  9   C10B  8DC0A0       STA   $A0C0
 10   C10E  4C74A4       JMP   $A474
.?
```

RESTORE

```
.
  0   C111  207900       JSR   $0079
  1   C114  9003         BCC   $C119
  2   C116  4C1DA8       JMP   $A81D
  3   C119  D003         BNE   $C11E
  4   C11B  4C1DA8       JMP   $A81D
  5   C11E  208AAD       JSR   $AD8A
  6   C121  20F7B7       JSR   $B7F7
  7   C124  A514         LDA   $14
  8   C126  853F         STA   $3F
  9   C128  A515         LDA   $15
 10   C12A  8540         STA   $40
 11   C12C  A900         LDA   #$00
 12   C12E  8557         STA   $57
 13   C130  A908         LDA   #$08
 14   C132  8558         STA   $58
 15   C134  A003         LDY   #$03
 16   C136  B157         LDA   ($57),Y
 17   C138  C53F         CMP   $3F
 18   C13A  D011         BNE   $C14D
 19   C13C  A004         LDY   #$04
 20   C13E  B157         LDA   ($57),Y
 21   C140  C540         CMP   $40
 22   C142  D009         BNE   $C14D
 23   C144  A557         LDA   $57
 24   C146  8541         STA   $41
 25   C148  A558         LDA   $58
 26   C14A  8542         STA   $42
 27   C14C  60           RTS
```

```
28  C14D  A004    LDY  #$04
29  C14F  B157    LDA  ($57),Y
30  C151  C540    CMP  $40
31  C153  900D    BCC  $C162
32  C155  D027    BNE  $C17E
33  C157  A003    LDY  #$03
34  C159  B157    LDA  ($57),Y
35  C15B  C53F    CMP  $3F
36  C15D  9003    BCC  $C162
37  C15F  4C7EC1  JMP  $C17E
38  C162  A002    LDY  #$02
39  C164  B157    LDA  ($57),Y
40  C166  855A    STA  $5A
41  C168  A001    LDY  #$01
42  C16A  B157    LDA  ($57),Y
43  C16C  8559    STA  $59
44  C16E  38      SEC
45  C16F  A559    LDA  $59
46  C171  E901    SBC  #$01
47  C173  8557    STA  $57
48  C175  A55A    LDA  $5A
49  C177  E900    SBC  #$00
50  C179  8558    STA  $58
51  C17B  4C34C1  JMP  $C134
52  C17E  A211    LDX  #$11
53  C180  4C37A4  JMP  $A437
.?
.
```

PRINT @

```
 0  C183  207900  JSR  $0079
 1  C186  C940    CMP  #$40
 2  C188  F003    BEQ  $C18D
 3  C18A  4CA0AA  JMP  $AAA0
 4  C18D  2093C1  JSR  $C193
 5  C190  4CA0AA  JMP  $AAA0
```

Position cursor for @

```
 6  C193  207300  JSR  $0073
 7  C196  209EB7  JSR  $B79E
 8  C199  8657    STX  $57
 9  C19B  20F1B7  JSR  $B7F1
10  C19E  8658    STX  $58
11  C1A0  E028    CPX  #$28
12  C1A2  B006    BCS  $C1AA
13  C1A4  A557    LDA  $57
14  C1A6  C91A    CMP  #$1A
15  C1A8  9003    BCC  $C1AD
16  C1AA  4C48B2  JMP  $B248
17  C1AD  2066E5  JSR  $E566
18  C1B0  A557    LDA  $57
19  C1B2  F009    BEQ  $C1BD
20  C1B4  A911    LDA  #$11
21  C1B6  2016E7  JSR  $E716
22  C1B9  C657    DEC  $57
23  C1BB  D0F7    BNE  $C1B4
24  C1BD  A558    LDA  $58
25  C1BF  F009    BEQ  $C1CA
26  C1C1  A91D    LDA  #$1D
27  C1C3  2016E7  JSR  $E716
28  C1C6  C658    DEC  $58
29  C1C8  D0F7    BNE  $C1C1
30  C1CA  20FDAE  JSR  $AEFD
31  C1CD  60      RTS
.?
.
```

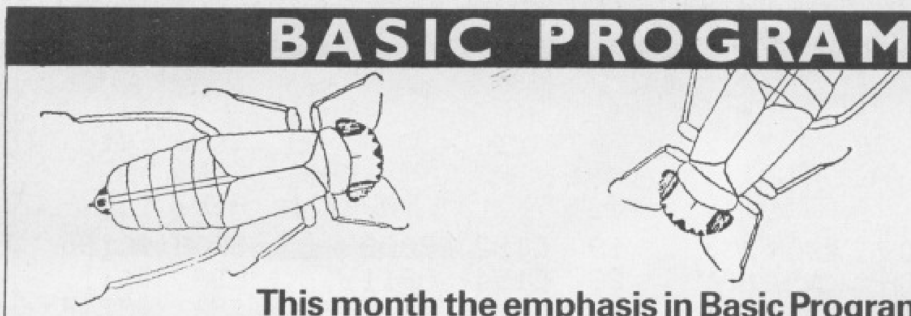
Input @

```
 0  C1CE  207900  JSR  $0079
 1  C1D1  C940    CMP  #$40
 2  C1D3  F003    BEQ  $C1D8
 3  C1D5  4CBFAB  JMP  $ABBF
 4  C1D8  2093C1  JSR  $C193
 5  C1DB  4CBFAB  JMP  $ABBF
.?
.
```

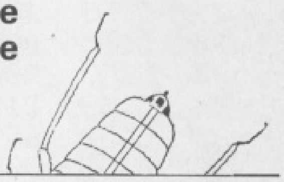
POKE!

```
 0  C1DE  207900  JSR  $0079
 1  C1E1  C921    CMP  #$21
 2  C1E3  F003    BEQ  $C1E8
 3  C1E5  4C24B8  JMP  $B824
 4  C1E8  207300  JSR  $0073
 5  C1EB  208AAD  JSR  $AD8A
 6  C1EE  20F7B7  JSR  $B7F7
 7  C1F1  A514    LDA  $14
 8  C1F3  8557    STA  $57
 9  C1F5  A515    LDA  $15
10  C1F7  8558    STA  $58
11  C1F9  20FDAE  JSR  $AEFD
12  C1FC  208AAD  JSR  $AD8A
13  C1FF  20F7B7  JSR  $B7F7
14  C202  A000    LDY  #$00
15  C204  A514    LDA  $14
16  C206  9157    STA  ($57)
17  C208  C8      INY
18  C209  A515    LDA  $15
19  C20B  9157    STA  ($57)
20  C20D  60      RTS
.?
.
READY.
```

BASIC PROGRAMMING



This month the emphasis in Basic Programming is on graphics. There's a routine for the 64 and anther for the VIC. You can take a break in between with a new game called Eatman.



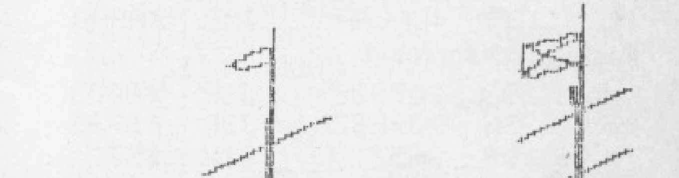
64

ARTIST

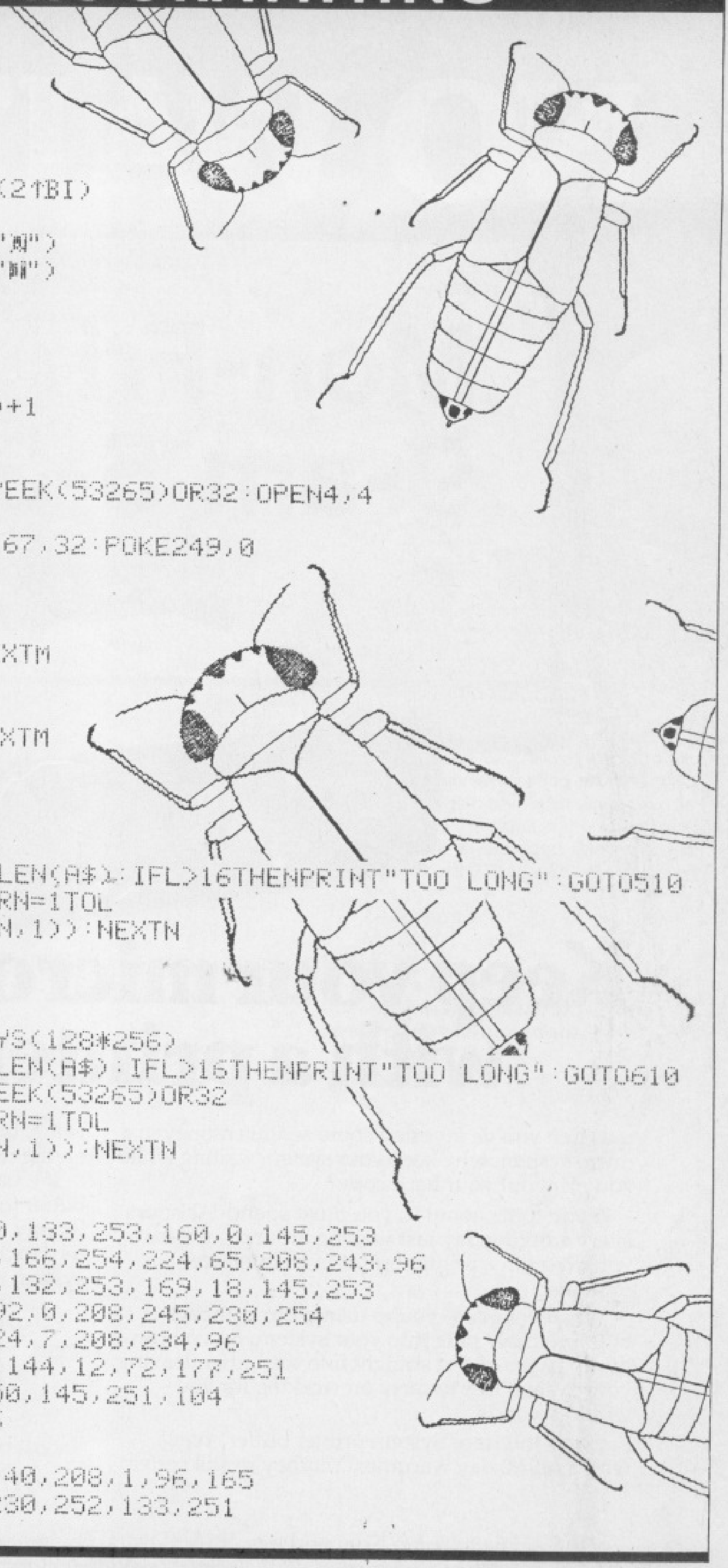
This program, written by David Le Quesne, allows you to plot a display using the cursor keys on the 64 and then dump the display to the printer (a seikosha printer is the required printer). The displays can be, if required, stored on disk as well. Instructions for the use of the program are included in it and some examples of the displays possible are also given.

```
READY.


1 PRINT"▒▒▒▒ARTIST▒"
2 PRINT"THIS PROGRAM ALLOWS YOU TO CREATE"
3 PRINT"HI RES PICTURES,AND DUMP THEM TO DISC"
4 PRINT"OR PRINTER"
6 PRINT"HI-RES MODE CONTROLS :-USE CURSOR KEYS"
7 PRINT"▒▒▒▒+/-KEYS,CURSOR ON/OFF"
8 PRINT"▒▒▒▒↑ KEY GIVES 8*/1* CURSOR SPEED"
9 PRINT"▒▒▒▒E KEY RETURNS TO MENU MODE":PRINT"▒▒▒▒CLR CLEARS
THE SCREEN"
10 POKE56,32:POKE52,32:W=128*256:FORN=0TO56
20 READX:POKEW+N,X:NEXTN
21 W=150*256:FORN=0TO172
22 READX:POKEW+N,X:NEXTN
23 W=207*256:FORN=0TO65:READX:POKEW+N,X:NEXTN
24 REM//BLOCK LOAD/SAVE//
25 PRINT"▒PRESS A CHARACTER KEY TO CONTINUE▒"
26 GETZ$:IFZ$=""GOTO26
30 POKE53272,21:POKE53265,PEEK(53265)AND223:PRINT"▒▒▒"
31 PRINT"          MENU"
32 PRINT"▒▒(1)  CREATE PICTURE"
33 PRINT"▒▒(2)  SAVE PICTURE"
34 PRINT"▒▒(3)  READ PICTURE"
35 PRINT"▒▒(4)  PRINT PICTURE"
36 PRINT"▒▒(5) VIEW PICTURE"
37 PRINT"▒▒(6)  END"
38 INPUT"▒▒▒▒▒>>>>>>";K
39 ONKGOTO77,500,600,400,78
40 END
77 SYS(128*256)
78 POKE53272,29:POKE53265,PEEK(53265)OR32
79 SYS(128*256+24)
80 BASE = 8192
85 CO=5
86 CM=1
90 A=100:B=100
100 CH=INT(B/8)
```



```
110 RO=INT(A/8)
120 LN=A AND 7
130 BY=BASE+RO*320+8*CH+LN
140 BI=7-(BAND7)
150 POKEBY,PEEK(BY)OR(2↑BI)
155 IFCO=0THENPOKEBY,(0)AND(2↑BI)
160 GETA$
170 A=A+CM*(A$="⌉")-CM*(A$="▓")
180 B=B+CM*(A$="▓")-CM*(A$="▓")
184 IFA$="▒"GOTO77
185 IFA$="+"THENCO=5
186 IFA$="-"THENCO=0
187 IFA$="£"GOTO30
188 IFA$="↑"THENCM=-7*(CM=1)+1
189 IFA$="▒"THENGOTO30
190 GOTO100
400 POKE53272,29:POKE53265,PEEK(53265)OR32:OPEN4,4
405 P1=38491:W=65*256
410 PRINT"⌉":POKE166,0:POKE167,32:POKE249,0
420 FORN=1TO29
430 SYS(P1)
440 A$="":FORM=1TO250
450 A$=A$+CHR$(PEEK(W+M)):NEXTM
460 PRINT#4,CHR$(8)A$;
461 A$="":FORM=251TO319
462 A$=A$+CHR$(PEEK(W+M)):NEXTM
463 PRINT#4,CHR$(8)A$:NEXTN
470 PRINT#4,CHR$(15):CLOSE4
480 GOTO30
500 PRINT"⌉▓▓SAVE PICTURE"
510 INPUT"FILE NAME..";A$:L=LEN(A$):IFL>16THENPRINT"TOO LONG":GOTO510
520 W=207*256:POKEW+239,L:FORN=1TOL
530 POKEW+239+N,ASC(MID$(A$,N,1)):NEXTN
535 PRINT"SAVING PICTURE"
540 SYS(W)
550 GOTO30
600 PRINT"⌉▓▓LOAD PICTURE":SYS(128*256)
610 INPUT"FILE NAME..";A$:L=LEN(A$):IFL>16THENPRINT"TOO LONG":GOTO610
615 POKE53272,29:POKE53265,PEEK(53265)OR32
620 W=207*256:POKEW+239,L:FORN=1TOL
630 POKEW+239+N,ASC(MID$(A$,N,1)):NEXTN
640 SYS(W+37)
650 GOTO30
1000 DATA169,32,133,254,169,0,133,253,160,0,145,253
1010 DATA200,208,251,230,254,166,254,224,65,208,243,96
1020 DATA169,4,133,254,160,0,132,253,169,18,145,253
1030 DATA200,192,232,240,9,192,0,208,245,230,254
1040 DATA76,34,128,166,254,224,7,208,234,96
1100 DATA160,0,177,253,24,10,144,12,72,177,251
1110 DATA166,248,24,29,166,150,145,251,104
1120 DATA200,192,8,208,235,96
1140 DATA162,0,134,247,32,0
1150 DATA150,166,247,232,224,40,208,1,96,165
1160 DATA251,24,105,8,208,2,230,252,133,251
```



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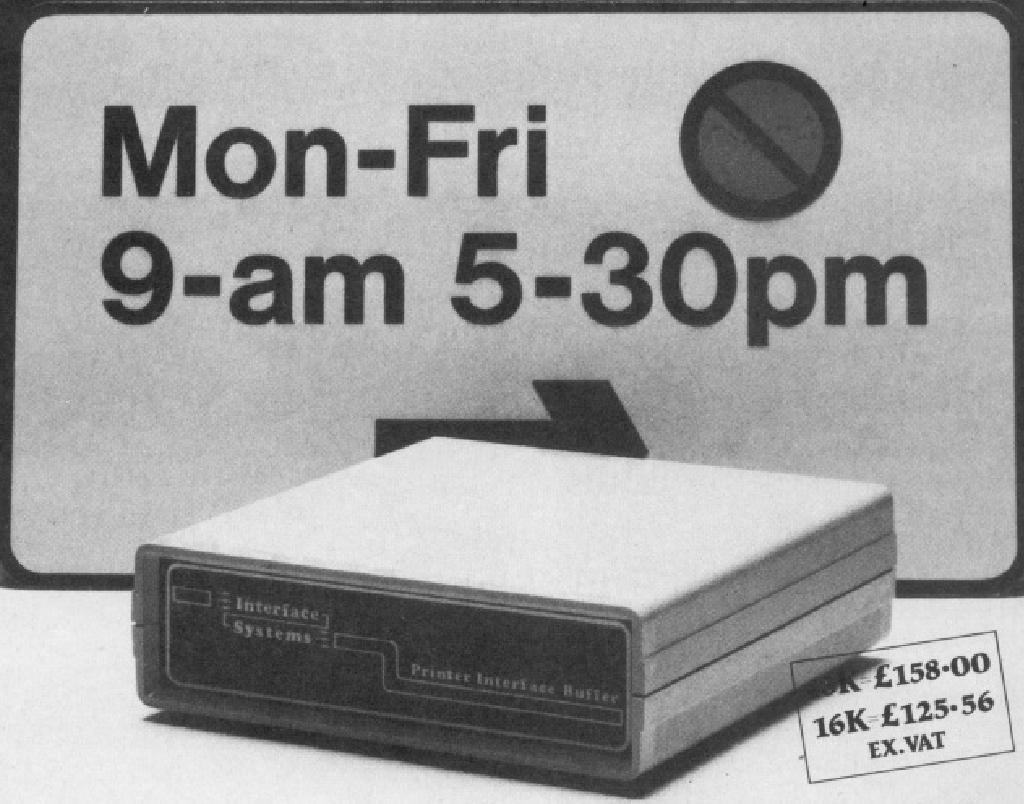

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```
1170 DATA165,253,24,105,8,144,2,230,254,133
1180 DATA253,76,28,150,169,128,160,0,145,251
1190 DATA200,240,11,192,64,208,247,166,252,224
1200 DATA66,208,241,96,230,252,208,236,96,169
1210 DATA65,133,252,162,0,134,251,134,248,32,66,150
1220 DATA162,0,134,251,169,65,133,252,165,166
1225 DATA133,253,165,167,133,254,32,26
1230 DATA150,166,249,232,224,8,208,15,162,0,230
1240 DATA167,165,166,24,105,56,144,2,230,167
1250 DATA133,166,134,249,230,166,208,2,230,167
1270 DATA166,248,232,224,7,240,5,134,248,76,104,150,96
1310 DATA1,2,4,8,16,32,64
1400 REM**BLOCKSAVE**
1410 DATA169,2,162,8,160,2,32,186,255
1420 DATA173,239,207,162,240,160,207,32,189,255
1430 DATA169,32,133,252,169,0,133,251,162,255,160,63
1440 DATA169,251,32,216,255,96
1450 REM**BLOCKLOAD**
1460 DATA169,2,162,8,160,2,32,186,255
1470 DATA173,239,207,162,240,160,207,32,189,255
1480 DATA169,0,162,255,160,255,32,213,255,96

READY.
```

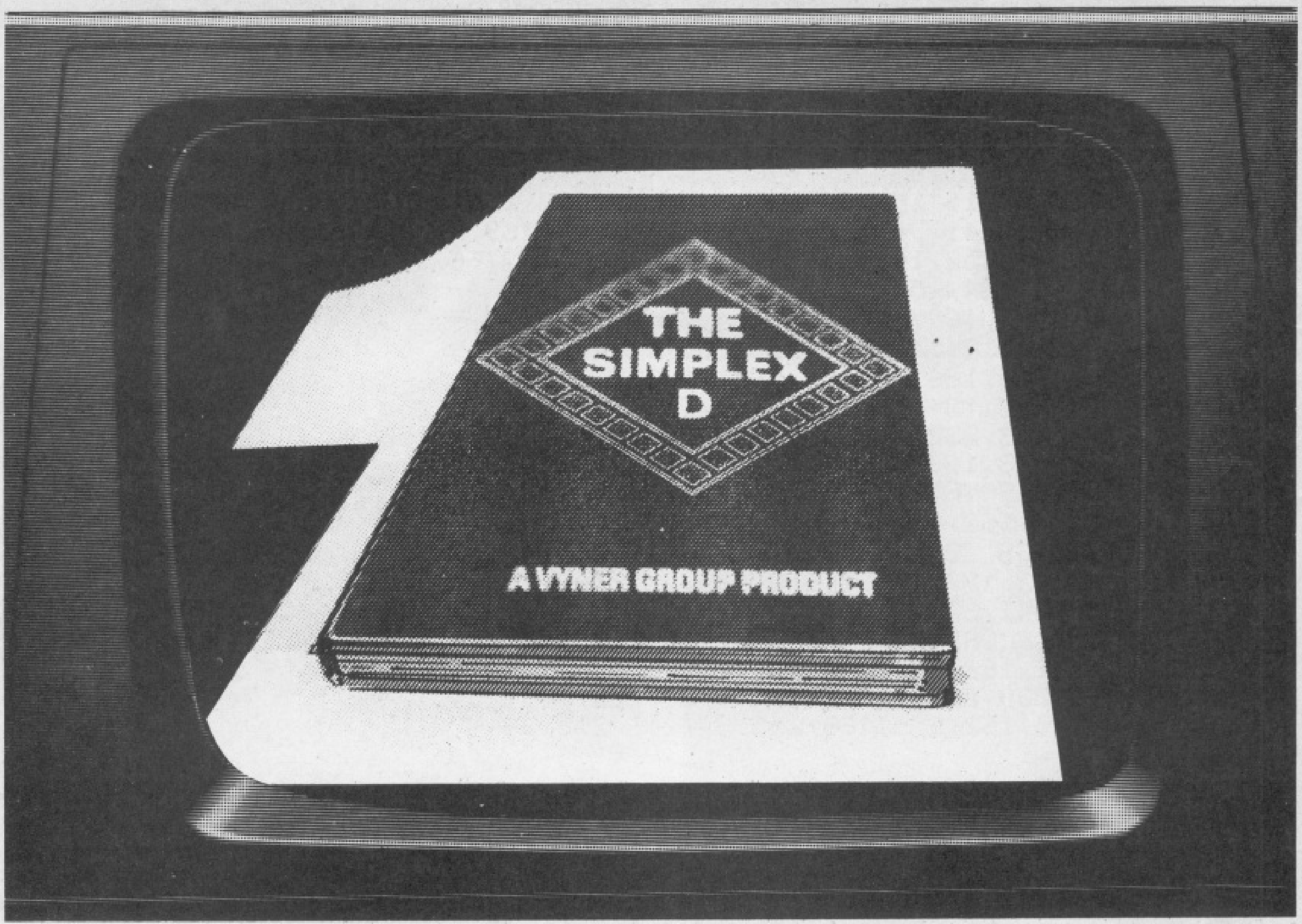
EATMAN

In this game written by Mark Johnson for the unexpanded VIC-20, you must move around the screen eating all the club characters to gain points. Beware, you die if you run into the sides of the screen or if the time limit is exceeded. Movement is achieved by using the keys:

A – up,
Z – down,
M – right,
and N – left.

When a screen has been cleared, 35 bonus points will be awarded and the next screen starts with more clubs.

```
 0 POKE36879,8:N$="NOBODY"
 1 POKE36878,15
 3 A=8000
 5 T=400
 6 PRINT"♥≡◘◘  HIGH SCORE"HS
 7 PRINT"◘◘◘◘   BY ";N$
 8 FORL=1TO3000:NEXT
 20 PRINT"♥≡◘       E-A-T-M-A-N"
 30 PRINT"◘◘       INSTRUCTIONS"
 40 PRINT"◘EAT THE CLUBS BEFORE THE TIME RUNS OUT"
 50 PRINT"◘◘          CONTROLS"
 60 PRINT"◘     A-UP"
 70 PRINT"     Z-DOWN"
 80 PRINT"     M-RIGHT"
 90 PRINT"     N-LEFT"
 110 PRINT"◘◘PRESS ANY KEY TO START"
 112 GETB$:IFB$=""THEN 112
 120 PRINT"♥"
 130 FORP=7680TO7701
 140 POKEP,90:POKEP+484,90
 150 NEXT
 160 FORH=7680TO8164STEP22
 170 POKEH,90:POKEH+21,90
 180 NEXT
 199 J=0
 200 POKEA,42
 210 P=INT(RND(1)*320)+7680+66
 220 J=J+1
 230 IFPEEK(P)=90 THEN J=J-1:GOTO 210
 231 IFPEEK(P)=88 THEN J=J-1
```



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```
 233 IFPEEK(P)=42 THEN J=J-1
 235 POKEP,88
 240 IFJ=17 THEN 260
 250 GOTO 210
 260 PRINT"SQQSCORE"S
 265 PRINT"SQ]]]]]]]]]]]]TIME LEFT]]]]]]]]]]]]]]]"T"  "
 270 GETA$
 280 IFA$="A"THEN POKEA,32:R=-22:H=1
 290 IFA$="Z"THEN POKEA,32:R=22:H=2
 300 IFA$="M"THEN POKEA,32:R=1:H=3
 310 IFA$="N"THEN POKEA,32:R=-1:H=4
 320 A=A+R
 321 T=T-1
 322 IFT=0THEN 5000
 330 IFPEEK(A)=88 THEN POKE36876,250:S=S+10:POKE36876,0
 333 IFPEEK(A)=90 THEN 2000
 340 POKEA,42
 350 IFH=1THEN POKEA+22,32
 360 IFH=2THEN POKEA-22,32
 370 IFH=3THEN POKEA-1,32
 380 IFH=4THEN POKEA+1,32
 460 IF S=I+170 THEN FORS=STOS+35:PRINT"SQQSCORE"S:NEXT:I=S:GOTO 199
 470 GOTO 260
 2000 FORQ=10TO0STEP-1
 2020 POKE36878,Q
 2030 FORM=1TO300:NEXT
 2035 POKE36877,220
 2040 NEXT
 2050 POKE36877,0
 2060 POKE36878,15
 2080 PRINT"♥QQQQ  YOU HAVE CRASHED":FORE=1TO3000:NEXT:GOTO 6010
 5000 POKE36878,15
 5010 FORL=1TO5
 5020 FORM=180TO235STEP2
 5030 POKE36876,M
 5040 FORN=1TO10
 5050 NEXT:NEXT
 5060 POKE36876,0
 5070 FORM=1TO100
 5080 NEXT:NEXT
 5090 POKE36876,0
 5092 PRINT"♥QQYOUR TIME HAS RUN OUT"
 5094 FORP=1TO4000:NEXT
 6010 IFS>HSTHENHS=S:GOSUB 9000
 6020 PRINT"QQDO YOU WANT ANOTHER GO"
 6030 PRINT"QQQ"
 6040 GETS$
 6050 IFS$="Y"THEN S=0:GOTO 1
 6060 IFS$="N"THEN PRINT"♥QQQQQ      THE END":FORK=1TO999999:NEXT
 6070 GOTO 6040
 9000 PRINT"♥QQYOU HAVE GOT THE HIGH SCORE"
 9010 PRINT"QQQINPUT YOUR NAME"
 9020 INPUT"QQ";N$:RETURN
READY.
```

BASIC PROGRAMMING

COPYING VIC20's HI-RES SCREEN

This program is a subroutine to produce a hardcopy of the hi-res screen on the VIC20. The program corrects for screen distortion. The copy is rather small because it is a direct translation of the hi-res area codes between RAM locations 4096-7295. The 8×8 VIC character matrix must be adapted to the smaller 7×7 printer matrix with some other code modifications. This forces a 90 degree shift in the orientation of the copy as compared to the screen. Dumping the whole screen takes a couple of minutes. And double width copies can be obtained by writing CHR$(X) anto A$ twice, but this requires splitting the output between A$ and another variable B$ each with 80 characters. See second listing.

Please note: This program reads the memory within the high resolution cartridge.

The program can be modified to dump a Hi-Res•screen located elsewhere if it is made of 20×20 characters each 8×8 pixels otherwise the loops will have to be modified.

This routine would be called by GOSUB 200 and would dump the screen to a serial VIC printer.

```
10 REM HI-RES SCREEN DUMPER FOR VIC
20 REM BY M. ALNAQEEB
200 OPEN4,4:REM OPEN PRINTER FILE
202 FORI=7135TO4095STEP-160
205 FORH=1TO160:REM SET READ CODE LOOP
210 TP=TP+1:REM SET COUNTER
220 X=PEEK(I+H):REM PEEK CODE
221 IFX>=128ANDX<192THENX=X+64:REM CHECK CODE  WITHIN  LIMITS  FOR
PRINTER
222 IFX<=127THENX=X+128:REM CHECK CODE WITHIN LIMITS FOR PRINTER
225 A$=A$+CHR$(X):REM CREATE THE HI-RES PRINTER STRING
242  IFTP=160THENPRINT#4,CHR$(8)A$:A$="":TP=0:REM  PRINT  &  EMPTY
STRING & SET COUNTER
250 NEXT:NEXT:PRINT#4:CLOSE4:RETURN:REM END  LOOPS,  CLOSE  FIE  &
RETURN
```

```
224 IFTP>80THENB$=B$+CHR$(X)
223 IFTP<81THENA$=A$+CHR$(X)
**** DELETE LINE NUMBER 242 ****
225 IFTP=160THENPRINT#4,CHR$(8)A$,B$:A$="":B$="":TP=0
```

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Reformed characters

This month we received a machine code routine which converts a Basic program in memory in such a way that all graphics characters in print statements are changed to a more readable form – mnemonics, in fact, which ought immediately bring to mind the English word.

This is a very useful program which makes reading the print-out much easier. All characters with ASCII values between 33 and 95 will not be changed – but since they are the normal characters there's no need for them to be changed.

The method for doing this is to scan through the program until a '"' character is encountered and then to replace the graphics characters with the mnemonics. If there are multiple characters in the program, a number will be put before the code.

The codings are as follows (make a note of them as we will be using them ourselves for the more unreadable lines of program):

[BLK]	Black
[WHT]	White
[RED]	Red
[CYN]	Cyan
[BRN]	Brown
[LT RED]	Light Red
[GR1]	Grey 1
[LT GRN]	Light Green
[CR]	Cursor Right
[CL]	Cursor Left
[CU]	Cursor Up
[CD]	Cursor Down
[PUR]	Purple
[GRN]	Green
[BLU]	Blue
[YEL]	Yellow
[ORG]	Orange
[LT BLU]	Light Blue
[GR2]	Grey 2
[GR3]	Grey 3
[CLS]	Clear Screen
[HOM]	Cursor Home
[REV]	Reverse on
[OFF]	Reverse off
[DEL]	Delete
[F1]-[F8]	Function Keys
[CTRL?]	Control + letter
[G<?]	Commodore + letter
[G>?]	Shift + letter
[SPC]	Space
[G>SPC]	Shifted Space

Multiple Codings – eg [12SPC]

The coding for a space will only occur if more than one space character is found in a row. If only one space character is found, it will be printed as a space.

There are two error messages that could be printed when the coding program is run. The first is 'OUT OF MEMORY' which will occur if the codings force the program to exceed the memory limits of the computer. The second message reads 'TOO MANY CHARS IN ????' where ???? is the line number. This will occur if the codings force a certain line above the 255 byte limit of the computer.

The program is specifically for the 64, but with some modifications to the addresses used, will work on the other machines. Only two ROM routines were used in this program, one being $A3BF which opens up a space in a Basic program, and $A437 which is the routine to print an error message.

Entering the program.

If you have a monitor, you might find it easier to type it in from the memory dumps which follow. But for the majority, a basic loader has been included.

The Monitor Dumps come in five parts for different parts of the routines. In the same way, the data has been split into five parts and each part has been check-summed for data errors.

The last and most important thing to know is how to use it:

Load the Lister program into memory and then load the Basic program to be listed. When the program has been loaded, type SYS49152 and the lister will get to work.

The longer the program, the more time it will take to convert. As long as the program has not given an error, the program may be listed to the printer or the screen.

NOTE: Once the Lister program has been run on a program in memory, the program in memory will not give the correct display. It is only meant for making programs easier to read and enter.

Main routine

```
.:C000 A2 00 A5 2B 85 FB A5 2C
.:C008 85 FC A0 00 B1 FB 85 FD
.:C010 C8 B1 FB 85 FE C9 00 D0
.:C018 01 60 C8 C8 C8 B1 FB C9
.:C020 00 D0 0D A5 FD 85 FB A5
.:C028 FF 85 FC A2 00 4C 0A C0
.:C030 C9 22 D0 0A E8 E0 02 D0
.:C038 0C A2 00 4C 1C C0 E0 01
.:C040 F0 03 4C 1C C0 C9 FF D0
::C048 03 4C 1C C0 85 66 18 C9
.:C050 C0 90 04 D8 38 E9 60 C9
.:C058 60 B0 07 C9 21 90 03 4C
.:C060 1C C0 86 64 85 65 84 5C
```

```
.:C068 A2 01 C8 B1 FB C5 66 D0
.:C070 04 E8 4C 6A C0 86 66 E0
.:C078 01 F0 02 B0 0A CA A5 65
.:C080 C9 20 D0 03 4C A7 C1 8A
.:C088 85 5D A9 0A 85 5E A2 08
.:C090 A9 00 06 5D 2A C5 5E 90
.:C098 04 E5 5E E6 5D CA D0 F2
.:C0A0 D8 18 69 30 85 5E 18 D8
.:C0A8 A5 5D 69 30 85 5D A5 65
 :C0B0 C9 61 B0 03 4C 16 C1 C9
.:C0B8 7B 90 03 4C 16 C1 D8 38
.:C0C0 E9 20 85 65 A2 07 A5 5D
.:C0C8 C9 30 D0 08 CA A5 5E C9
```

```
.:C0D0 30 D0 01 CA E4 66 F0 0B
.:C0D8 B0 06 20 00 C2 4C E3 C0
.:C0E0 20 A8 C2 A4 5C A9 5B 91
.:C0E8 FB A5 5D C9 30 F0 03 C8
.:C0F0 91 FB A5 66 C9 01 F0 05
.:C0F8 A5 5E C8 91 FB A9 47 C8
.:C100 91 FB A9 3E C8 91 FB A5
.:C108 65 C8 91 FB A9 5D C8 91
.:C110 FB A6 64 4C 1C C0 85 65
.:C118 A9 50 85 62 A9 C3 85 63
.:C120 A2 50 A0 00 B1 62 C5 65
.:C128 F0 09 C8 C8 C8 CA 10 F4
.:C130 4C FA C6 C8 B1 62 85 C1
.:C138 C8 B1 62 85 63 A5 C1 85
.:C140 62 A0 00 B1 62 85 C1 D8
.:C148 18 69 04 AA A5 5D C9 30
.:C150 D0 08 CA A5 5E C9 30 D0
.:C158 01 CA E4 66 F0 0B B0 06
.:C160 20 00 C2 4C 69 C1 20 A8
.:C168 C2 A4 5C A9 5B 91 FB A5
.:C170 5D C9 30 F0 03 C8 91 FB
.:C178 A5 66 C9 01 F0 05 A5 5E
.:C180 C8 91 FB 84 5C A0 00 EA
.:C188 EA C8 B1 62 84 C2 A4 5C
.:C190 C8 91 FB 84 5C A4 C2 C4
.:C198 C1 D0 EE A4 5C A9 5D C8
.:C1A0 91 FB A6 64 4C 1C C0 A4
.:C1A8 5C A6 64 4C 1C C0 00 00
```

Memory move and reclaiming routine

```
.:C200 86 C2 A5 66 38 E5 C2 85
.:C208 BB 18 A5 FB 65 5C 85 5F
.:C210 A5 FC 69 00 85 60 A5 5F
.:C218 65 BB 85 5A A5 60 69 00
.:C220 85 5B A5 2D 38 E5 5A 85
.:C228 58 A8 A5 2E E5 5B AA E8
.:C230 98 F0 1F A5 5A 18 65 58
.:C238 85 5A 90 03 E6 5B 18 A5
.:C240 5F 65 58 85 5F 90 02 E6
.:C248 60 98 49 FF A8 C8 C6 5B
.:C250 C6 60 B1 5A 91 5F C8 D0
.:C258 F9 E6 5B E6 60 CA D0 F2
.:C260 38 A5 2D E5 BB 85 2D B0
.:C268 03 C6 2E 38 A0 00 A5 FD
 :C270 E5 BB 85 FD 91 FB 85 57
.:C278 A5 FE E9 00 C8 85 FE 85
.:C280 58 91 FB 88 B1 57 85 B9
.:C288 C8 B1 57 85 BA F0 18 88
.:C290 38 A5 B9 E5 BB AA 91 57
.:C298 A5 BA E9 00 C8 91 57 85
.:C2A0 58 AA 85 57 4C 83 C2 60
```

```
.:C2A8 8A 38 E5 66 85 BB 18 A5
.:C2B0 5C 65 BB B0 04 C9 FE 90
.:C2B8 03 4C 41 C7 A5 2D 65 BB
.:C2C0 AA A5 2E 69 00 C5 38 D0
.:C2C8 07 E4 37 90 03 4C 63 C7
.:C2D0 18 A5 2D 85 5A 65 BB 85
.:C2D8 58 A5 2E 85 5B 69 00 85
.:C2E0 59 A5 FB 65 5C 85 5F A5
.:C2E8 FC 69 00 85 60 20 BF A3
.:C2F0 18 A0 00 A5 2D 65 BB 85
.:C2F8 2D 90 03 E6 2E 18 A5 FD
.:C300 65 BB 85 FD 85 57 91 FB
.:C308 A5 FE 69 00 C8 85 FE 85
.:C310 58 91 FB 88 B1 57 85 B9
.:C318 C8 B1 57 85 BA F0 18 88
.:C320 18 A5 B9 65 BB AA 91 57
.:C328 A5 BA 69 00 C8 91 57 85
 :C330 58 AA 85 57 4C 13 C3 60
```

Data address table

```
.:C350 05 38 C5 11 3C C5 12 3F
.:C358 C5 13 43 C5 1C 47 C5 1D
.:C360 4B C5 1E 4E C5 1F 52 C5
.:C368 20 56 C5 60 5A C5 7B 5E
.:C370 C5 7C 62 C5 7D 66 C5 7E
.:C378 6A C5 7F 6C C5 81 70 C5
.:C380 85 74 C5 86 77 C5 87 7A
.:C388 C5 88 7D C5 89 80 C5 8A
.:C390 83 C5 8B 86 C5 8C 89 C5
.:C398 90 8C C5 91 90 C5 92 93
.:C3A0 C5 93 97 C5 94 9B C5 95
.:C3A8 9F C5 96 A3 C5 97 A9 C5
.:C3B0 98 AD C5 99 B1 C5 9A B7
.:C3B8 C5 9B BD C5 9C C1 C5 9D
.:C3C0 C5 C5 9E C8 C5 9F CC C5
.:C3C8 A0 D0 C5 A1 D6 C5 A2 DA
.:C3D0 C5 A3 DE C5 A4 E2 C5 A5
.:C3D8 E6 C5 A6 EA C5 A7 EE C5
.:C3E0 A8 F2 C5 A9 F6 C5 AA FA
.:C3E8 C5 AB FE C5 AC 02 C6 AD
.:C3F0 06 C6 AE 0A C6 AF 0E C6
.:C3F8 B0 12 C6 B1 16 C6 B2 1A
.:C400 C6 B3 1E C6 B4 22 C6 B5
.:C408 26 C6 B6 2A C6 B7 2E C6
.:C410 B8 32 C6 B9 36 C6 BA 3A
.:C418 C6 BB 3E C6 BC 42 C6 BD
.:C420 46 C6 BE 4A C6 BF 4E C6
.:C428 01 52 C6 02 58 C6 08 5E
.:C430 C6 09 64 C6 0E 6A C6 8E
.:C438 70 C6 8D 76 C6 00 A6 00
```

Data table

```
.:C538 03 57 48 54 02 43 44 03
.:C540 52 45 56 03 48 4F 4D 03
.:C548 52 45 44 02 43 52 03 47
.:C550 52 4E 03 42 4C 55 03 53
.:C558 50 43 03 47 3E 2A 03 47
.:C560 3E 2B 03 47 3C 2D 03 47
.:C568 3E 2D 01 7E 03 47 3C 2A
.:C570 03 4F 52 47 02 46 31 02
.:C578 46 33 02 46 35 02 46 37
.:C580 02 46 32 02 46 34 02 46
.:C588 36 02 46 38 03 42 4C 4B
.:C590 02 43 55 03 4F 46 46 03
.:C598 43 4C 53 03 44 45 46 03
.:C5A0 42 52 4E 05 4C 20 52 45
.:C5A8 44 03 47 52 31 03 47 52
.:C5B0 32 05 4C 20 47 52 4E 05
.:C5B8 4C 20 42 4C 55 03 47 52
.:C5C0 33 03 50 55 52 02 43 4C
.:C5C8 03 59 45 4C 03 43 59 4E
.:C5D0 05 47 3E 53 50 43 03 47
.:C5D8 3C 4B 03 47 3C 49 03 47
.:C5E0 3C 54 03 47 3C 40 03 47
.:C5E8 3C 47 03 47 3C 2B 03 47
.:C5F0 3C 4D 03 47 3C 5C 03 47
.:C5F8 3E 5C 03 47 3C 4E 03 47
.:C600 3C 51 03 47 3C 44 03 47
.:C608 3C 5A 03 47 3C 53 03 47
.:C610 3C 50 03 47 3C 41 03 47
.:C618 3C 45 03 47 3C 52 03 47
.:C620 3C 57 03 47 3C 48 03 47
.:C628 3C 4A 03 47 3C 4C 03 47
.:C630 3C 59 03 47 3C 55 03 47
.:C638 3C 4F 03 47 3E 40 03 47
.:C640 3C 46 03 47 3C 43 03 47
.:C648 3C 58 03 47 3C 56 03 47
.:C650 3C 42 05 43 54 52 4C 41
.:C658 05 43 54 52 4C 42 05 43
.:C660 54 52 4C 48 05 43 54 52
.:C668 4C 49 05 43 54 52 4C 4E
.:C670 05 43 52 47 3E 4E 05 43
.:C678 52 47 3E 4D 00 1B E4 00
```

Error messages routines and data

```
.:C6FA A5 5F C9 1B 90 03 4C 69
.:C702 C7 69 40 8D 18 C7 A9 13
.:C70A 85 62 A9 C7 85 63 4C 41
.:C712 C1 05 43 54 52 4C 4A 20
.:C71A 4E 49 20 53 52 41 48 43
.:C722 20 59 4E 41 4D 20 4F 4F
.:C72A 54 20 0D 20 4E 49 20 4E
.:C732 57 4F 4E 4B 20 54 4F 4E
.:C73A 20 52 41 48 43 20 0D A2
.:C742 14 BD 18 C7 20 D2 FF CA
.:C74A D0 F7 A0 02 B1 FB 85 39
.:C752 C8 B1 FB 85 3A 20 C9 BD
.:C75A 68 68 4C 19 C0 EA EA EA
.:C762 EA 20 35 A4 00 40 00 00
```

Basic loader program

```
1 RESTORE
5 GOTO3000
10 DATA162,0,165,43,133,251,165
20 DATA44,133,252,160,0,177,251
30 DATA133,253,200,177,251,133,254
40 DATA201,0,208,1,96,200,200
50 DATA200,177,251,201,0,208,13
60 DATA165,253,133,251,165,254,133
70 DATA252,162,0,76,10,192,201
80 DATA34,208,10,232,224,2,208
90 DATA12,162,0,76,28,192,224
100 DATA1,240,3,76,28,192,201
110 DATA255,208,3,76,28,192,133
120 DATA102,24,201,192,144,4,216
130 DATA56,233,96,201,96,176,7
140 DATA201,33,144,3,76,28,192
150 DATA134,100,133,101,132,92,162
160 DATA1,200,177,251,197,102,208
170 DATA4,232,76,106,192,134,102
180 DATA224,1,240,2,176,10,202
190 DATA165,101,201,32,208,3,76
200 DATA167,193,138,133,93,169,10
210 DATA133,94,162,8,169,0,6
220 DATA93,42,197,94,144,4,229
230 DATA94,230,93,202,208,242,216
240 DATA24,105,48,133,94,24,216
250 DATA165,93,105,48,133,93,165
260 DATA101,201,97,176,3,76,22
270 DATA193,201,123,144,3,76,22
280 DATA193,216,56,233,32,133,101
290 DATA162,7,165,93,201,48,208
300 DATA8,202,165,94,201,48,208
310 DATA1,202,228,102,240,11,176
320 DATA6,32,0,194,76,227,192
330 DATA32,168,194,164,92,169,91
340 DATA145,251,165,93,201,48,240
350 DATA3,200,145,251,165,102,201
360 DATA1,240,5,165,94,200,145
370 DATA251,169,71,200,145,251,169
380 DATA62,200,145,251,165,101,200
390 DATA145,251,169,93,200,145,251
400 DATA166,100,76,28,192,133,101
410 DATA169,80,133,98,169,195,133
```

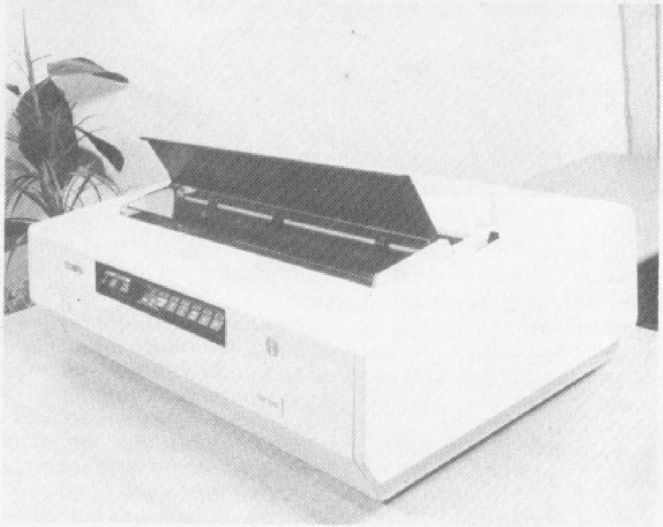
```
420 DATA99,162,80,160,0,177,98
430 DATA197,101,240,9,200,200,200
440 DATA202,16,244,76,250,198,200
450 DATA177,98,133,193,200,177,98
460 DATA133,99,165,193,133,98,160
470 DATA0,177,98,133,193,216,24
480 DATA105,4,170,165,93,201,48
490 DATA208,8,202,165,94,201,48
500 DATA208,1,202,228,102,240,11
510 DATA176,6,32,0,194,76,105
520 DATA193,32,168,194,164,92,169
530 DATA91,145,251,165,93,201,48
540 DATA240,3,200,145,251,165,102
550 DATA201,1,240,5,165,94,200
560 DATA145,251,132,92,160,0,234
570 DATA234,200,177,98,132,194,164
580 DATA92,200,145,251,132,92,164
590 DATA194,196,193,208,238,164,92
600 DATA169,93,200,145,251,166,100
610 DATA76,28,192,164,92,166,100
620 DATA76,28,192,-1
630 DATA134,194,165,102,56,229,194
640 DATA133,187,24,165,251,101,92
650 DATA133,95,165,252,105,0,133
660 DATA96,165,95,101,187,133,90
670 DATA165,96,105,0,133,91,165
680 DATA45,56,229,90,133,88,168
690 DATA165,46,229,91,170,232,152
700 DATA240,31,165,90,24,101,88
710 DATA133,90,144,3,230,91,24
720 DATA165,95,101,88,133,95,144
730 DATA2,230,96,152,73,255,168
740 DATA200,198,91,198,96,177,90
750 DATA145,95,200,208,249,230,91
760 DATA230,96,202,208,242,56,165
770 DATA45,229,187,133,45,176,3
780 DATA198,46,56,160,0,165,253
790 DATA229,187,133,253,145,251,133
800 DATA87,165,254,233,0,200,133
810 DATA254,133,88,145,251,136,177
820 DATA87,133,185,200,177,87,133
830 DATA186,240,24,136,56,165,185
840 DATA229,187,170,145,87,165,186
850 DATA233,0,200,145,87,133,88
860 DATA138,133,87,76,131,194,96
870 DATA138,56,229,102,133,187,24
880 DATA165,92,101,187,176,4,201
890 DATA254,144,3,76,65,199,165
900 DATA45,101,187,170,165,46,105
910 DATA0,197,56,208,7,228,55
920 DATA144,3,76,99,199,24,165
930 DATA45,133,90,101,187,133,88
940 DATA165,46,133,91,105,0,133
950 DATA89,165,251,101,92,133,95
960 DATA165,252,105,0,133,96,32
970 DATA191,163,24,160,0,165,45
980 DATA101,187,133,45,144,3,230
990 DATA46,24,165,253,101,187,133
1000 DATA253,133,87,145,251,165,254
1010 DATA105,0,200,133,254,133,88
1020 DATA145,251,136,177,87,133,185
1030 DATA200,177,87,133,186,240,24
1040 DATA136,24,165,185,101,187,170
1050 DATA145,87,165,186,105,0,200
1060 DATA145,87,133,88,138,133,87
1070 DATA76,19,195,96,-1
1080 DATA5,56,197,17,60,197,18
1090 DATA63,197,19,67,197,28,71
1100 DATA197,29,75,197,30,78,197
1110 DATA31,82,197,32,86,197,96
1120 DATA90,197,123,94,197,124,98
1130 DATA197,125,102,197,126,106,197
1140 DATA127,108,197,129,112,197,133
1150 DATA116,197,134,119,197,135,122
1160 DATA197,136,125,197,137,128,197
1170 DATA138,131,197,139,134,197,140
1180 DATA137,197,144,140,197,145,144
1190 DATA197,146,147,197,147,151,197
1200 DATA148,155,197,149,159,197,150
1210 DATA163,197,151,169,197,152,173
1220 DATA197,153,177,197,154,183,197
1230 DATA155,189,197,156,193,197,157
1240 DATA197,197,158,200,197,159,204
1250 DATA197,160,208,197,161,214,197
1260 DATA162,218,197,163,222,197,164
1270 DATA226,197,165,230,197,166,234
1280 DATA197,167,238,197,168,242,197
1290 DATA169,246,197,170,250,197,171
1300 DATA254,197,172,2,198,173,6
1310 DATA198,174,10,198,175,14,198
1320 DATA176,18,198,177,22,198,178
1330 DATA26,198,179,30,198,180,34
1340 DATA198,181,38,198,182,42,198
1350 DATA183,46,198,184,50,198,185
1360 DATA54,198,186,58,198,187,62
1370 DATA198,188,66,198,189,70,198
1380 DATA190,74,198,191,78,198,1
1390 DATA82,198,2,88,198,8,94
1400 DATA198,9,100,198,14,106,198
1410 DATA142,112,198,141,118,198,-1
1420 DATA3,87,72,84,2,67,68
1430 DATA3,82,69,86,3,72,79
1440 DATA77,3,82,69,68,2,67
1450 DATA82,3,71,82,78,3,66
1460 DATA76,85,3,83,80,67,3
1470 DATA71,62,42,3,71,62,43
1480 DATA3,71,60,45,3,71,62
1490 DATA45,1,126,3,71,60,42
```

```
1500 DATA3,79,82,71,2,70,49
1510 DATA2,70,51,2,70,53,2
1520 DATA70,55,2,70,50,2,70
1530 DATA52,2,70,54,2,70,56
1540 DATA3,66,76,75,2,67,85
1550 DATA3,79,70,70,3,67,76
1560 DATA83,3,68,69,70,3,66
1570 DATA82,78,5,76,32,82,69
1580 DATA68,3,71,82,49,3,71
1590 DATA82,50,5,76,32,71,82
1600 DATA78,5,76,32,66,76,85
1610 DATA3,71,82,51,3,80,85
1620 DATA82,2,67,76,3,89,69
1630 DATA76,3,67,89,78,5,71
1640 DATA62,83,80,67,3,71,60
1650 DATA75,3,71,60,73,3,71
1660 DATA60,84,3,71,60,64,3
1670 DATA71,60,71,3,71,60,43
1680 DATA3,71,60,77,3,71,60
1690 DATA92,3,71,62,92,3,71
1700 DATA60,78,3,71,60,81,3
1710 DATA71,60,68,3,71,60,90
1720 DATA3,71,60,83,3,71,60
1730 DATA80,3,71,60,65,3,71
1740 DATA60,69,3,71,60,82,3
1750 DATA71,60,87,3,71,60,72
1760 DATA3,71,60,74,3,71,60
1770 DATA76,3,71,60,89,3,71
1780 DATA60,85,3,71,60,79,3
1790 DATA71,62,64,3,71,60,70
1800 DATA3,71,60,67,3,71,60
1810 DATA88,3,71,60,86,3,71
1820 DATA60,66,5,67,84,82,76
1830 DATA65,5,67,84,82,76,66
1840 DATA5,67,84,82,76,72,5
1850 DATA67,84,82,76,73,5,67
1860 DATA84,82,76,78,5,67,82
1870 DATA71,62,78,5,67,82,71
1880 DATA62,77,-1
1890 DATA165,95,201,27,144,3,76
1900 DATA105,199,105,64,141,24,199
1910 DATA169,19,133,98,169,199,133
1920 DATA99,76,65,193,5,67,84
1930 DATA82,76,74,32,78,73,32
1940 DATA83,82,65,72,67,32,89
1950 DATA78,65,77,32,79,79,84
1960 DATA32,13,32,78,73,32,78
1970 DATA87,79,78,75,32,84,79
1980 DATA78,32,82,65,72,67,32
1990 DATA13,162,20,189,24,199,32
2000 DATA210,255,202,208,247,160,2
2010 DATA177,251,133,57,200,177,251
2020 DATA133,58,32,201,189,104,104
2030 DATA76,25,192,234,234,234,234
2040 DATA32,53,164,-1

3000 A=49152:B=49581:C=49664:D=49975:E=50000:F=50236:G=50488:H=50811
3010 I=50938:J=51045:K=0
3015 PRINT"[CLS][2CD][12CR][REV] LISTER PROGRAM "
3020 PRINT"[2CD][2CR][REV] PROCESSING DATA - PLEASE WAIT "
3030 FORZ=ATOB:READY:IFY=-1THEN3060
3035 K=K+Y:POKEZ,Y:NEXT
3040 READY:IFY=-1THEN4000
3050 IFK=58105THEN4000
3060 PRINT"[2CD][REV] DATA ERROR IN LINES 10 - 620 ":END
```

```
4000 K=0:FORZ=CTOD:READY:IFY=-1THEN4030
4005 K=K+Y:POKEZ.Y:NEXT
4010 READY:IFY=-1THEN5000
4020 IFK=41386THEN5000
4030 PRINT"[2CD][REV] DATA ERROR IN LINES 630 - 1070 ":END
5000 K=0:FORZ=ETOF:READY:IFY=-1THEN5030
5005 K=K+Y:POKEZ,Y:NEXT
5010 READY:IFY=-1THEN6000
5020 IFK=35484THEN6000
5030 PRINT"[2CD][REV] DATA ERROR IN LINES 1080 - 1410 ":END
6000 K=0:FORZ=GTOH:READY:IFY=-1THEN6030
6005 K=K+Y:POKEZ.Y:NEXT
6010 READY:IFY=-1THEN7000
6020 IFK=17491THEN7000
6030 PRINT"[2CD][REV] DATA ERROR IN LINES 1420 - 1880 ":END
7000 K=0:FORZ=ITOJ:READY:IFY=-1THEN7030
7005 K=K+Y:POKEZ.Y:NEXT
7010 READY:IFY=-1THEN8000
7020 IFK=11236THEN8000
7030 PRINT"[2CD][REV] DATA ERROR IN LINES 1890 - 2040 ":END
8000 PRINT"[3CD][2CR][REV] DATA INPUTTED "
8010 PRINT"[2CD][2CR][REV] SYS 49152 TO USE "
8030 END

READY.
```



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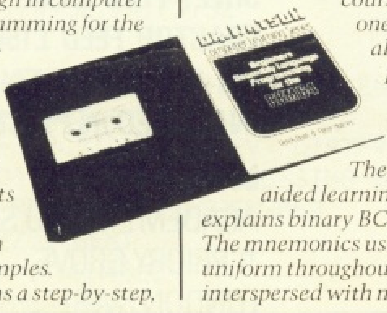
Each course contains a step-by-step, easy-to-follow text in paperback book form, supported by software on cassette. The cassette is loaded into your computer at the start of the course and provides all the major programs described in the text.



Dr Watson assembly language courses are the first real ones for beginners. They allow you to write programs in a manner that is logical and easy to read and understand.

They have a computer aided learning (CAL) tutor which explains binary BCD and hexadecimal. The mnemonics used are totally uniform throughout and the course is interspersed with numerous exercises and their solutions. A bonus is that a full assembler is included, and remains useful long after you have completed the course.

Dr Watson BASIC Courses teach you how to write programs in a form as near to plain English as possible. Courses are based on projects; each one gradually introducing new commands, so that by the end of the course you will have utilised the full vocabulary of the machine's BASIC.

All the courses come in a library-style folder for safe and easy storage. And are available from WH Smiths, Boots, Menzies and leading microcomputer multiples for just £14.95. (£11.95 for the CBM 64 Children's BASIC Adventure – Part 1.)

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Before you buy a micro – make sure Dr Watson has the course.

In our review of the Cash Traders' Bookkeeping System in the December issue we omitted to mention that it provides Trial Balance, Trading Account, Profit and Loss Account and Balance Sheet; VAT accounting and the detail necessary for the statistics section of the C & E form.

The VAT on an abbreviated VAT inclusive purchase invoice is calculated and displayed instantly by pressing the S key. For a non-VAT registered business the VAT calculation is omitted by pressing the E key.

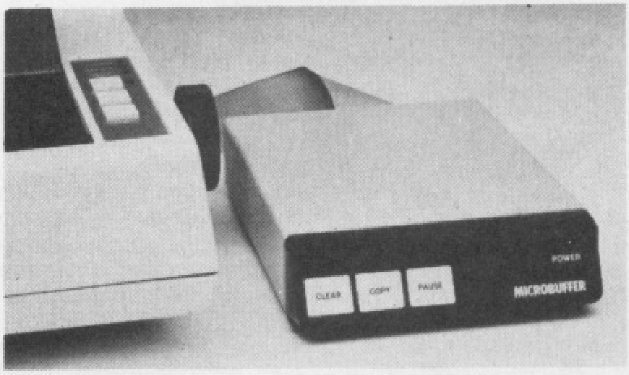
The UPARROW key breaks the sequence either to allow the user to correct an entry or – at the beginning of a procedure – to exit from it. You can not step successively backwards out of the program by repeatedly pressing the UPARROW key, as we said in our review. You finally reach a screen which prompts 'Return to menu?'. This screen will not respond to the UPARROW key and you can only get out of the system by pressing N.

Inmac launch new microbuffers

Inmac have produced a microbuffer that is capable of storing 64K in its memory and then dumping it all down to the printer leaving the micro free to perform other operations.

It is fully compatible with many printers including Centronics. There are two versions of the microcomputer, one parallel and the other serial. Hooking up to the micro and the printer is done using the standard cables.

On the front of the unit are three touch sensitive controls. The clear button erases any text stored in the buffer's memory and pause allows the printer to be temporarily halted in the case of a ribbon change. The third control enables the release of all stored data which can be copied 255 times if need be.



Data is transferred at a rate of 4000 characters per second and the cost of £225 each includes an AC adaptor. The parallel version also comes with a two metre printer to buffer cable, whilst the serial model is equipped with RS232 interfaces, two handshake modes, nine baud rates and a bypass feature for instant printer access.

This product carries a one year guarantee and a 30 day trial period. It can be obtained from Inmac UK Limited, Davy Road, Astmoor, Runcorn, Cheshire WA7 1QF

Software for laboratories

Following on from their range of Rexagan interfaces which were first exhibited at last years Commodore show, ICI have produced three packages aimed at scientists in industry, research and education. These packages are Rexagan Tomult, RSP and Droptest.

Tomult is a multitasking system for writing complex real time control applications in BASIC. Tomult works by interrupting the BASIC interpreter at the end of each line and then assessing which task is the most important.

RSP is the Rexagan Statistical Package designed to provide procedures for processing and evaluating experimental results. However this can only be done to data that is presented in a tabular format. This data can then be edited, mathematically transformed and then evaluated. For instance, this package can print out any two columns fo data on an ordinary printer.

The third package. Droptest, is more specialised. This will produce numeric and grpahic results from processed readiness obtained from high speed recorders during the impact testing of plastics.

Tomult cost £450, RSP £145 and the cost of Droptest is dependent on the application.

Further information is available from Physics and Radiosotope Services, Imperial Chemical Industries plc, PO Box 1, Billingham, Cleveland TS23 1LB telephone 0642 553661.

Compsoft halve price of DMS

The price of the Data Management Systems from Compsoft has been slashed from £400 to £195.

The cause of this substantial drop in price is the competition provided by other database systems, notably Compsoft's other database system, the Delta which was released last year but is not yet available for the Commodore machines.

This drop in price does not mean that the DMS has lost any of its capabilities, but is vastly more competitive.

Both of these data base systems are designed with several record applications in mind. The major difference between the two packages concerns the record size. Whereas the Delta can hold 2000 characters and 90 fields per record the DMS can cope with only 100 and 60 respectively.

The DMS system was the winner of the 1983 Recongnition for Information and Technological Achievements awards 'Software Product of the Year.' The DMS is available from Compsoft, Hallams Court, Shamley Green, Guildford, Surrey GU4 8QZ telephone 0483 898545.

The address of Construction-O Computers Services is 27 Bell Street, Reigate, Surrey RH2 7AD, Bell Street as printed in our November issue.

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Future editorial will be directed towards new and potential Commodore owners as well as more experienced and business users. Therefore by advertising yourself as a dealer our readers will know where to buy their hardware and software.

Simplicity itself

Fellowes Manufacturing have introduced a group of diskette file units called the Simplicity Range.

The diskette album will hold up to thirty 8", 5.25" or twenty 3.5" diskettes. A desk top easel binder will hold 20 diskettes and costs £12.

For the larger computer systems there is the diskette desk stand which will protect 200 diskettes per unit. These stands are made of metal and cost £187. Other models are designed as hanging wallets to fit existing filing cabinets.

Details on all these products are available from Fellowes Manufacturing (UK) Limited, Doncaster Road, Kirk Sandall, Doncaster, South Yorkshire DN3 1HT.

Consulting a computer to choose a computer

The founder of Atlas Computer Consultants, Maurice Hamlin, has found a novel and interesting way of selecting a computer that is ideal to the requirements of the user. His consultancy uses a computer to select the number.

Using Atlas's system, an analysis of the customers business is fed into a databank which holds information on each system from 1,200 suppliers. The computer will also identify 25,000 programs in 320 areas of industrial, business and professional life.

There are many problems associated with buying a computer. Potential users are often confused by the ever increasing number of computers "designed with the businessman in mind", by what the manufacturers claim their machines are capable of and by the jargon that surrounds computers.

Some of these problems are caused by computer consultants themselves who do not have a clear grasp of all the different makes of computers on the market. This is one of the disadvantageous results of the computer boom – assimilating information on hundreds of new companies and thousands of new units is a real burden to most computer consultancies.

Atlas's computerised answer to this has already brought results. Take the case of London Weekend Television who needed word processing and small scale departmental computing from one supplier. The initial choice of 69 possible suppliers was quickly short-listed to four and finally down to one.

Maurice Hamlin advocates this approach because he says "we are facing the most rapid technological growth ever. You need a computer to pick your way through the jungle."

The drawback is that at the moment, Atlas can only cover their own area of the country although they do plan to expand their services. They are at Atlas Computer Consultants Limited, Manchester Road, Bolton, Lancashire BL2 1EX

Colour projectors for business micros

Two new colour projectors that interface directly with the Commodore PET have been introduced by Powerhouse Enterprises. The first projection system is called the Barco Data projector which, the manufacturers say "produces crystal clear, multi-standard video pictures and high definition computer text or graphics.

The second projection system is the PCP 1000. This is a colour data and graphics video projector capable of reproducing a four foot by six foot picture on a screen.

These projection systems provide many types of on-line prenstations for large audiences and make use of the Powerhouse universal Processor Switch. It is this switch that enables many video sources to be integrated into a single system and thus provide a comprehensive audio/visual tool for many applications within the computer industry.

Control of the system is by remote control and the system can accomodate Pretel adaptors, mono and colour visual display terminals as well as being able to accept images from conventional video storage sources.

Powerhouse Enterprises will provide total system design, and engineering support including the development of all necessary interfaces. They can be contacted at The Old Power House, Chapel Rise, Avon Castle, Ringwood, Hants. BH2 2BL telephone

Training consultancy

Data-Train is a new company set up to help users of Commodore hardware and software.

The aim of the company is to give a complete service to the user and this means that the company will be acting as a consultancy as well as being able to configure and install systems and train staff using the system. A the moment, such systems include Tomorrow's Office and Silicon Office. Dealers who are unable to train users, sell the complete system to the customer and then get Data-Train to install the package and train the user.

The company, who also help to run two courses for the Training Division of the Manpower Services Commission, will also provide a telephone back-up service at a small additional cost.

For further information contact Data-Train, Unit A17, Cowdray Centre, Cowdray Avenue, Colchester, Essex CO1 1BH telephone 0206 44002.

New monitor

The new Vision-Ex Colour Video monitor is capable of input from both video signal and RGB separate input signal and costs £265 (exc. VAT). This light-weight, compact 12 inch monitor is equipped with a smoked filter to reduce eye strain and a 0.7W audio speaker. Manufactured by Data Efficiency it is compatible with Apple, BBC or Commodore, as it is so simply switchable.

Get it taped

Currently available from Wabash DataTech (International) Ltd., is an informative leaflet describing its MIRA-1000. A new generation of high performance tape engineered specifically for the 6250 drive.

The leaflet highlights the MIRA-1000 as a minor miracle in magnetic media, with tests at a major university comfirming that it is superior to any other computer tape for 6250 drives.

Brief details of the MIRA-1000 are given. It is an ultra-smooth, ultra-high performance tape engineered for maximum integrity and recording reliability and has a 25-year warranty. Product specifications listed include physical characteristics, performance characteristics and environmental characteristics. Further information available from Stephen Fisher, Wabash DataTech, Tel: (0245) 322380.

Monitor market

Under a new dealership agreement, the complete range of monochrome, colour and sound monitors marketed by Sanyo Marubeni (UK) Limited is to be distributed in the UK by STC Electronic Services.

STC Electronic Services already handles a number of computer peripheral products which are marketed to computer dealers and systems builders. The Sanyo monitors will form a new product line for the company and will complement its existing product range which includes VDU's and printers.

Sanyo monitors to be handled by STC include its models DM2112, a high performance data display monitor, Model DM8112CX, a 12inch CRT display monitor, models CD3125N, CD3117M and CD3115H which are colour monitors offering normal, medium and high resolution. The company will be also distributing the Sanyo CD3195, a 14inch PAL colour monitor with sound. A further product being handled by STC is the widely acclaimed Sanyo DR101 cassette recorder designed for use with personal computer systems.

Write your own games

Anybody wishing to writer their own games for the VIC 20 or the Commodore 64 can now do so with the help of two programs from Galactic Software.

These Games Designer programs allow the programmer to design practically anything normally found in other games. Monsters, spaceships, meteors, moonscapes et al can all move about the screen and the game can be as difficult as the programmer decides to make it. These Games Designer programs allow the programmer to use full colour high resolution graphics, sound effects and theme tunes.

The manufacturers claim that no programming experience is needed to make use of the programs. The cost of these programs is £9.50 for the VIC 20 and £11.50 for the Commodore 64. They should be available from local computer dealers. Failing this, they can be obtained from Galactic Software, Unit 7, Larchfield Estate, Dowlish Ford, Ilminster, Somerset TA19 0PF, telephone 04605 5161.

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Calco Software

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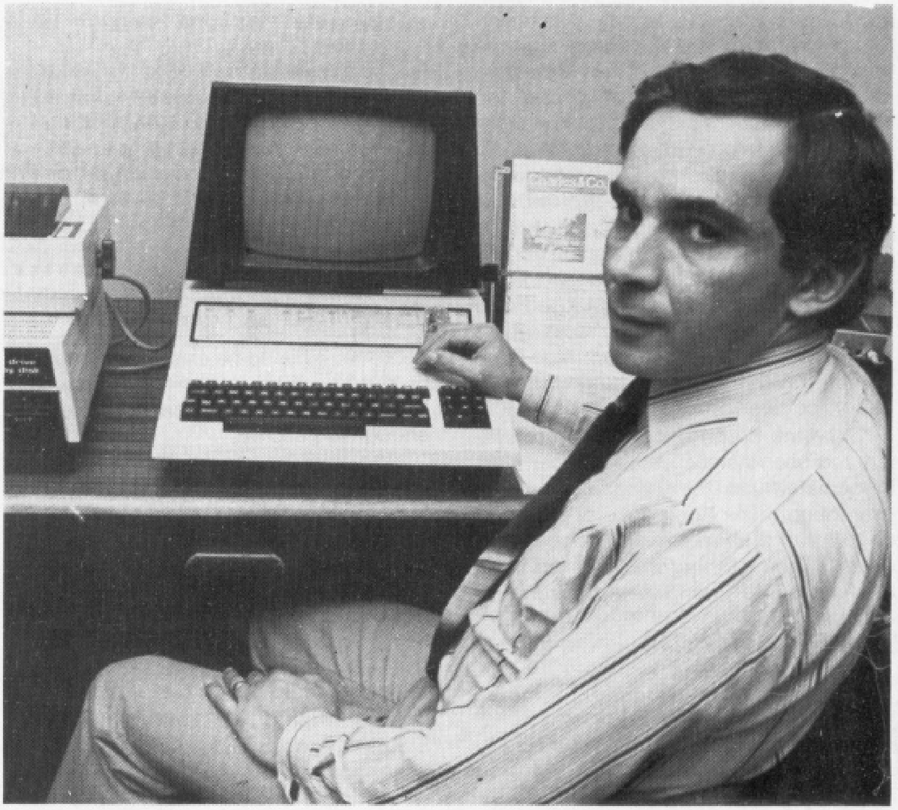
The 64 sells houses

Estate agents are unlikely matchmakers but their main function is remarkably similar to the function of a dating agency. Instead of matching personal likes and dislikes they match the property likes and dislikes of potential purchasers with the specifications of properties on their books. Computer dating has been around for some time but computers are only just beginning to have an impact in estate agents' offices. We went to see one estate agent who has developed his own software package for use on Commodore machines.



Two years ago Michael Landau, an estate agent working in Kenton, Harrow, started to develop a program with Colin Jardine, an experienced computer programmer, to help improve the efficiency of his business. In most surburban areas, there are two types of estate agents; the established well-known agents which depend on their name for business and those smaller agents who survive by co-operating with each other.

Charles & Co fit into the latter category and are currently working with about 40 other agents. When each of these agents has a new property to sell they send the details round to all the other co-operating agents for inclusion on their property lists. In this way their properties will be seen by a greater number of people and if a sale is made, the commission is split. Rival agents are usually extremely competitive, but they work on the principle that even half commission is better than none at all!

The Residential Estate Agents Computer System has been especially developed for coping with a higher volume of applicants and properties including those from direct instructions and those from other agents.

The package consists of two floppy disks, one for properties and one for applicants. On these the estate agent can enter details of his own properties and those from other agents distinguishing them by code numbers. Details of applicants can also be entered and a matching function enables the agent to send personalised property lists out. For Charles & Co an average week brings 1 to 12 properties from direct instructions and other agents usually send in 50 or more properties for inclusion, but the system can deal with 650 properties and 800 applicants.

The main advantage of this system is that it can process applicant and property details quickly and efficiently.

Before the package was introduced the properties came in and were left in trays until there were enough to compile a detailed list of properties in each of the three categories; houses under £50,000, houses over £50,000 and flats and maisonettes. (There used to be a category for houses under £35,000, but it is no longer applicable!). In this way, a property might lie in a tray for a month before being dealt with and a seemingly unsellable property may be left out of the list for months. Each applicant would get a list crammed with properties and would have to sift through looking for something suitable.

One month later this list would be revised and four new ones made. As well as these, any properties coming in would be matched with applicants and sent off. The whole laborious process is time consuming and allows a lot of errors to occur.

The package changes all that. Before operating the system some planning is needed. Each of the co-operating agents needs an identifying code and there is a maximum of 50 codes. The territory in which the user is working has to be divided into a maximum of 10 areas. Some applicants may specify which area they want to move to. The agent and area codes should be kept close to the computer for easy reference. Also categories and sizes are used frequently in describing properties and so there should be some common standard familiar to everybody working with the system. For instance bedrooms, kitchens, gardens have to be listed as large, medium or small and the condition of a property has to be categorised as bad, average, good, excellent. A very useful feature is the system of pricing properties. If the price an applicant is prepared to pay is between £35 – 40,000 there is space for the inclusion for properties a few thousand above the maximum – just in case the buyer decides he is prepared to stretch his price further to procure a better house. In this case the applicant would get a list of properties ranging in price from £35 – 42,000. Similarly if an applicant wants a semi-detached house with a small garden in average condition he would get a list of properties including semi-detached and also detached, in average to excellent condition and with small to large-sized gardens. Within the price range they will always be given more than they asked for.

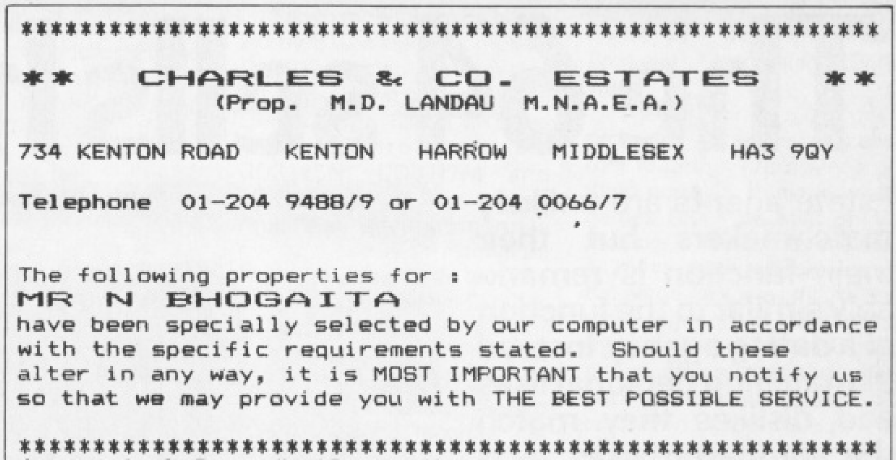
Once the Commodore hardware system has been installed, the agent can start immediately as the program is very user-friendly. The Applicant disk goes into drive 0 and the Properties disk goes into drive 1. The first thing that is asked for is the date and then the main menu appears:

1. Property Matching
2. Property Listing
3. Property Create/Modify
4. Matched Applicant Lists
5. Applicant File Functions
6. Applicant Listing
7. System Shut-down

The user can then select whichever function is required. When new properties come in they can be entered into the system using the Property Create/Modify key. This program includes four screens and 240 characters for free description. On the first screen the street name is typed into the line for address and the system will list any other properties on that street thus avoiding duplication. If it is a new property, the rest of the address can be put in. The vendor's name must be entered along with the code number.

The next screen shows the property address and the first detail to be entered is the Structure Type. Listed on the print out of Property File Functions are all the options available. It is important to fill every category as no answer or O is the equivalent of answering Yes/No/Not known/Doesn't Matter. The functions on the property file are fairly extensive and most properties would be comprehensively covered.

There are some useful functions for an estate agent incorporated into this screen ensuring the adequate covering of property details. For instance, if there is a third bedroom it has to be classed as a double or single so that a family of six would know if the third bedroom was big enough to sleep two.



```
***********************************************************

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have been specially selected by our computer in accordance
with the specific requirements stated.  Should these
alter in any way, it is MOST IMPORTANT that you notify us
so that we may provide you with THE BEST POSSIBLE SERVICE.

***********************************************************
```

An example of a Personalised Property List showing layout of the Company Heading, the layout of property description and the disclaimer.

The third screen is for entering the dimensions of the main bedrooms. Any extra rooms and features can be included underneath where there is space for 240 characters. The print out demonstrates how the information is laid out on a personalised property list.

On the fourth screen a Menu is displayed with the following program options on it: 1. Modify Property Details, 2. Delete Property, 3. Change Property Status, 4. Property Identification and with these options it is possible to alter and delete data.

Once recorded on the system, the Property Matching Function is able to match the properties to the Applicants on file. A Property Screen will appear when this program is loaded in and once the Property Number has been entered the appropriate property will be located and displayed on the screen.

The Matched Applicants List is needed after the properties have been matched. Once the program is loaded, "Load Labels and Press Return" is displayed on the screen. The labels must be loaded onto the printer and lined up. The printer will automatically print all matched applicants with their names, addresses and applicant numbers appearing on the labels. The user is then given a choice to "Reprint or Continue". If "Continue" is chosen, plain paper replaces the labels and a report is automatically produced with the properties coded in an alpha lettering system matched to the appropriate applicants.

Up to 21 can be matched and at the bottom of the list a key relates the alpha coding to the property numbers. After this if 'C' is pressed again matching records are deleted from various files on the disk.

Otherwise the list can be printed out. The agent then has to stick the labels onto envelopes and using the list which matches applicants to properties, can put information on the relevant properties into the customer envelopes. The system of coded numbers makes the whole process extremely simple.

Similar to the Property Create/Modify program the Applicants File Functions enable the agent to list all the applicants and list their details and property requirements. The user calls up this program and enters the surname. All previous applicants with the same surname are displayed.

A new applicant is automatically allocated a number. Three lines of address are available plus space for telephone numbers. On this list, 21 main criteria with an average of four options per heading have to be filled in. The print out of the Applicant File function lists all the options available. If for an example an applicant doesn't want a house but stresses he wants nothing on the ground floor, a list of flats or maisonettes on first and all floors up will result.

After all the details have been keyed an Applicant Menu will appear: 1. Modify Applicant Detail, 2. Delete Applicant, 3. Applicant Matching, 4. Return to Applicant Identification. The first two functions are self-explanatory. The third function – Applicant Matching causes the system to select from the properties already stored on file those appropriate to the Applicants requirements. These properties can be displayed on the screen or printed out. A full list with all the property details of a condensed version without house number and ownership details can be chosen.

Finally it is possible to print all the information including room sizes and free description or a shortened version with just the address and price listed. It is also possible to select and print out the details of an individual property. The first of any of these property lists will automatically be preceded by the Company Heading similar to the one on the print out of the Personalised Property List.

To produce a list of all the properties entered before a certain date the Property Listing function is used. If an agent code is entered all the properties sent in by a particular agent will be listed, otherwise there is no discrimination. The Applicant Listings function is similar except that it lists all the Applicants on the system prior to or after the date that is entered.

At the end of the day it is important to take a back-up copy of the day's work. The floppy disks are fragile and any mishandling will result in all the work on a disk being corrupted. The System Shut Down option is used to close the system at the end of the day.

The complete package consisting of the Commodore hardware – CBM 64, disk drive, printer and software is being marketed at a cost of £3,690. Michael Landau has been using it for nearly two years now and reckons that it has already paid for itself. Property sales are likely to increase because the Applicant will have a wider selection of properties to choose from with the personalised list all of which are within the applicants price range and fit any specifications made. The 'companies properties can be sent out more frequently and human error is just about eliminated.

Notes on applicant file functions

1) STRUCTURE TYPE. The alternatives are 'H'ouse, 'B'ungalow, 'F'lat, 'M'aisonette & 'F/'lat/Maisonette.
2) PROPERTY TYPE. Terraced. Semi or Detached. (Type 'T', 'S' or 'D'). Terraced will produce matches on properties of all types. Semi will produce Semi & Detached.
3) ANTE/POST WAR. 'A' or 'P'.
4) LEASE. Minimum length of lease that will be considered. Press return if Freehold required, or nothing specified.
5/6) PRICES. Minimum price must be a lesser amount than Maximum price and must exceed £9,000. N.B. The greater the differential between Minimum & Maximum, the longer the matching & printing times.
7) P/B OR CONVERSION. Type in 'P' or 'C'. (Applies to Flats & Maisonettes only as does 8 or 9).
8) FLOOR. 'U'pper. 'F'irst. 'G'round. 'G/' (gives Ground/First Floor or Upper Floor with lift). 'N' (means not Ground Floor – will produce properties on all floors save ground).
9) LIFT. 'Y'es or 'N'o.
10) CENTRAL HEATING. 'Y'es or 'N'o.
11) CONDITION. Options are 'B'ad. 'F'air. 'A'verage. 'G'ood. 'E'xcellent. (i.e. Bad = Bad + Better. Fair = Fair + Better etc).
12) GARAGE. Options are 'Y'es, 'N'o or 'S'pace. (Space will produce matches of Properties with Garage or space for one).
13) DRIVE. Options are 'O'wn. 'S'hared. 'R'ear Access or 'N'o space.
14) CLOAKROOM. Answer 'Y'es or 'N'o.
15) GARDEN. Options are 'S'mall. 'M'edium. 'L'arge. (Medium will produce Medium + Large or vice versa). 'Y'es. 'N'o. 'C'ommunal.
16) SEPARATE WC. Options 'Y'es or 'N'o. (If there is a Cloakroom but no Separate WC a positive match on Separate WC will result irrespective).
17) KITCHEN SIZE. 'L'arge. 'M'edium. 'S'mall. (Medium matches on Medium & Large. Large Kitchen matches Medium Kitchen. i.e. Only small is excluded).
18) RECEPTION SIZE. 'L'arge. 'M'edium'. 'S'mall. (Operates as above).
19) 3RD BEDROOM. 'D'ouble or 'S'ingle. Only applies to properties where double 3rd Bedroom required. i.e. Will not produce matches on single 3rd Bedrooms. (Matches on 4-bedroomed properties will ignore this category so that applicants requiring 3 double or 4-bedroomed properties can be catered for).

Printout of the Applicant file, Lists the options available for customer specifications.

Notes on property file functions

1) PROPERTY TYPE. The alternatives are 'H'ouse. 'B'ungalow. 'F'lat. 'M'aisonette.
2) PROPERTY TYPE. 'T'erraced. 'S'emi. 'D'etached.
3) ANTE/POST WAR. 'A' or 'P'.
4) LEASE. Enter minimum acceptable number of years unexpired. Press return for Freehold.
5) PRICE REQUIRED. Enter asking price.
6) MINIMUM PRICE. Enter price that you think Vendor may accept (See introduction).
7) AREA. Enter appropriate number from 1 to 10.
8) P/B OR CONVERSION. Enter 'P' or 'C'.
9) FLOOR. Enter 'G'round. 'F'irst. 'U'pper.
10) LIFT. Enter 'Y'es or 'N'o.
11) CENTRAL HEATING. Enter 'Y'es or 'N'o.
12) CONDITION. Options are 'B'ad. 'F'air. 'A'verage. 'G'ood. 'E'xcellent.
13) GARAGE. Enter 'Y'es. 'N'o or 'S'pace.
14) DRIVE. Enter 'Y'es. 'N'o space. 'S'hared. 'O'wn. 'R'ear Access.
15) CLOAKROOM. 'Y'es or 'N'o.
16) GARDEN. Options are 'Y'es. 'N'o. 'S'mall. 'M'edium. 'L'arge.
17) SEPARATE WC. Options 'Y'es. 'N'o.
18) KITCHEN SIZE. 'S'mall. 'M'edium. 'L'arge.
19) RECEPTION SIZE. 'S'mall. 'M'edium. 'L'arge.
20) 3rd BEDROOM. 'D'ouble or 'S'ingle.
21) NUMBER OF RECEPTIONS. Enter number.
22) BEDROOMS. Enter number.
N.B. Entering Zero or leaving no answer to any of the above categories is the equivalent of answering Yes/No/Not Known/Doesn't matter.

Printout from the Property File showing the options available for describing a property.

Besides the above program there are other specialised packages developed for use in estate agents; Centaur £695, Clear £1,500, Estate Master £650 and Compsoft which is a generalised package with scope for use in an estate agents, £400.

Contacts

Centaur: A.C. Software Ltd, 13 Heavitree Road, EXETER, Devon EX1 2DL. Tel: 0392 211718.

Clear: Coopers Lybrand (NI) Associates Ltd, Fanum House, 108 Great Victoria House, BELFAST BT2 7AX. Tel: 0232 245452.

Estate Master: Alamo Computer Services, 2 Larch Close, Morton, MIDDLESBROUGH, Cleveland. Tel: 0642 3038.

Compsoft: Diamond, DMS/Delta, Hallams Court, Shamley Green, GUILDFORD, Surrey GU4 8QZ. Tel: 0483 898545.

The package described in the article is available from: M. Landau, Charles & Co., 734 Kenton Road, Kenton, Middlesex. Tel: 01-204 9488/9.

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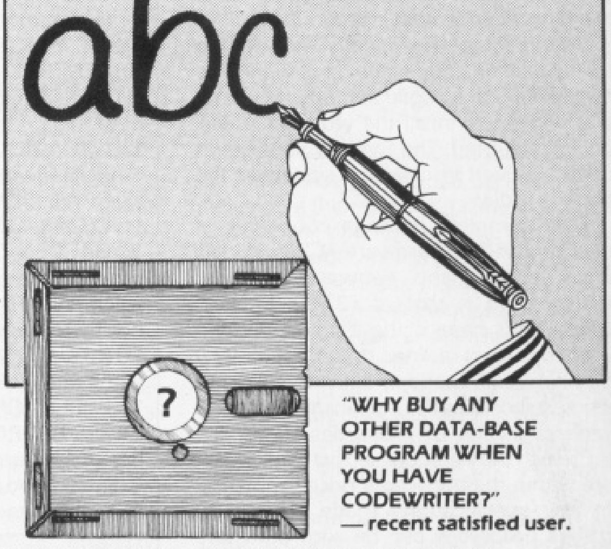

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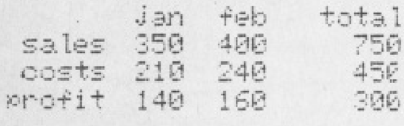
New accounting packages

This month we take a look at two spreadsheets for the Commodore 64 – a machine whose potential in business is still being explored. A spreadsheet can be immensely useful for businesses, especially in forecasting. A spreadsheet can answer the question 'What will happen if . . .' As well as being useful in the office spreadsheets also have their uses in the home.

Busicalc 2 is produced by Supersoft and is for the 64 in either a tape or disk version. Many of the features and capabilities of this program are taken from its successful predecessor, Busicalc. The first step that has to be taken with any spreadsheet is setting up the working area.

With Busicalc 2, the number of rows can vary from 20 to 999 and the number of columns from 2 to 125 although the sum of rows × columns can not exceed 2500. There is another restriction. The number of boxes multiplied by the column width can not exceed 22,500 although this prerequisite should not affect the size of the spreadsheet unless column width is greater than nine characters.



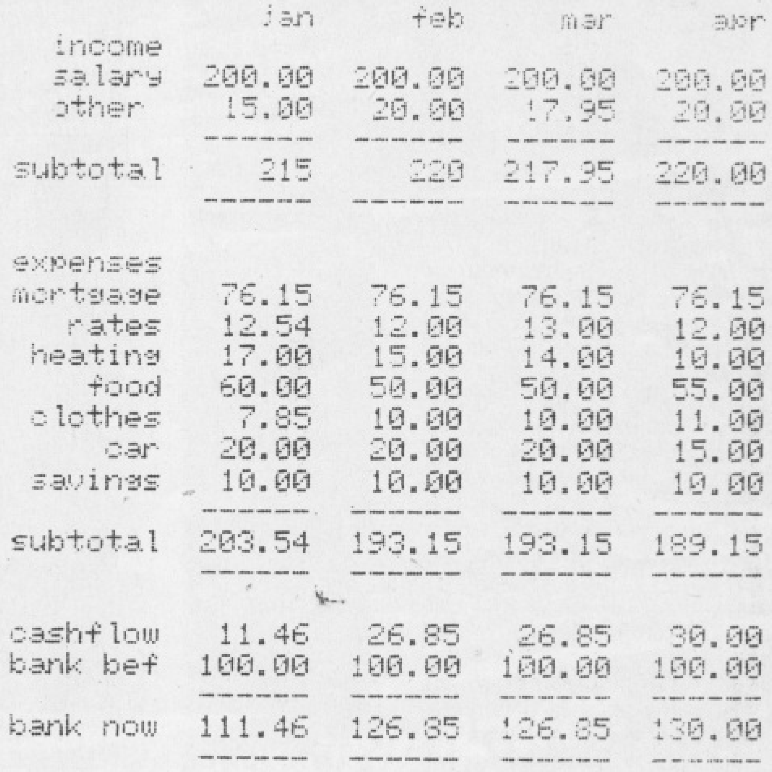
```
         jan  feb    total
  sales  350  400      750
  costs  210  240      450
 profit  140  160      300
```

Keeping a profit account on Busicalc 2.

Vertical and horizontal scrolling is performed very quickly as is the movement of the cursor using the the normal cursor keys. However, it is not possible to move from one end of the screen to the other using the CLR/HOME key. This function is performed by a program command called jump where the user specifies the address of the information required. The worksheet cursor is rendered inoperable once the program is in edit mode but cursor movement along the input line is still permitted.

It is in using these program commands that the user will come across the only comparatively poor feature of the program.

Changing the colour of the background is fiddly but because this is essentially only a piece of decoration, it should not be taken too seriously.



```
                jan       feb       mar       apr
   income
   salary    200.00    200.00    200.00    200.00
   other      15.00     20.00     17.95     20.00
             ------    ------    ------    ------
 subtotal       215       220    217.95    220.00
             ------    ------    ------    ------

 expenses
 mortgage     76.15     76.15     76.15     76.15
    rates     12.54     12.00     13.00     12.00
  heating     17.00     15.00     14.00     10.00
     food     60.00     50.00     50.00     55.00
  clothes      7.85     10.00     10.00     11.00
      car     20.00     20.00     20.00     15.00
  savings     10.00     10.00     10.00     10.00
             ------    ------    ------    ------
 subtotal    203.54    193.15    193.15    189.15
             ------    ------    ------    ------

 cashflow     11.46     26.85     26.85     30.00
 bank bef    100.00    100.00    100.00    100.00
             ------    ------    ------    ------
 bank now    111.46    126.85    126.85    130.00
             ------    ------    ------    ------
```

An example of how Busicalc 2 can keep track of financial accounts in the home.

Any part of the worksheet can be printed out and there are two print modes.

Any Commodore compatible printer should produce satisfactory results and all the user is required to do is set up the correct parameters as prompted by screen messages. The material that is output can be either an exact replica of data as it appears on the screen or a formula list.

All information and data will appear at the top of the screen before being transferred to the working area. Data is not limited to letters. Digits and formulae can also be entered. When calculations are being carried out, the number of characters per formula is not restricted by the width of the column and each formula must be pre-fixed by a certain symbol which will inform the micro what sort of operation is being carried out.

A simple example of this would be addition where the first address is always assumed to be positive. This would then be followed by the address to be added, the result being stored at the position of the cursor.

Formulas may also incorporate the more advanced mathematical functions needed to perform trigonometrical operations, logarithms and square roots. There are other calculations that can be performed which are less useful in everyday use. For instance, POS will test for a positive value and return a 0 or 1 accordingly. The opposite to this function is NEG that will test whether an expression is negative and returns a value of 1 or 0.

All of these functions are built-in features of the program but it may be that these will not suit the requirements of the user. This is a problem which all purchasers of such software face. Supersoft have attempted to solve this problem by providing the user with three user-definable functions, all of which can be accessed by the same method used to enable all the other functions.

At some stage in the usage of this system there will be seemingly endless numbers of calculations that are exactly the same. Calculating these nearly always becomes very boring and tedious and so it would be a good idea to make use of Busicalc 2's replicate function which copies both box contents and formulae from one area of the worksheet to another. The tape version will cost £69 and the disk version will cost £71. Both of these represent good value for money.

```
Column  a      Column  c
1              1
2              2
3              3   +c2*.6
4              4   +c2-c3
Column  b      Column  d
1              1
2              2   +b2+c2
3   +b2*.6     3
4   +b2-b3     4   +d2-d3
```

This formula printout gives all the details of calculations that will produce a profit and loss account.

```
          jan    feb    mar    apr    may    june   july   totals
  sales   200    250    300    350    400    450    500    2450
   cost   250    300    350    400    450    500    550    2800
 profit   -50    -50    -50    -50    -50    -50    50     -250
```

Analysing monthly profit with Busicalc 2.

The second package is produced by Abrasco. The cost of Abracalc is £27.50 for disk and £25.00 for tape. Both of these are astonishingly low prices and it is easy to see why. Admittedly it does have more features than some of its rivals but the quality is certainly not very high and the manufacturer's claim that it is far better value must be doubted.

A screen format similar to that of Practicalc is the basis of the spreadsheet, with the three control lines at the top. It is these three lines that show the current location of the cursor that the spreadsheet is addressing. The data area of the spreadsheet is composed of 1040 cells; that is 1040 different addresses of data on a 26 × 40 grid.

Below this main section of the spreadsheet is a help section which is merely a list of commands available. This is quite helpful but all the commands and functions are adequately described in the manual and so the user does not lose anything by deleting the help section and thus widening the work area of the screen.

This is done quite easily and quickly. If only the operation of actually moving the cursor round the screen was as quick. Using the usual cursor keys, cursor movement is appallingly slow and cumbersome. With any good spreadsheet and in an ideal situation, the user should have difficulty seeing the cursor move. There are other ways of moving the cursor namely the CLR/HOME key. Instead of having to mess about and wait all the time it is far quicker and simpler to specify the location that you want the cursor to go to. Incidentally, there are two cursors, the other one flashing incessantly on the control line.

ABRASCO
software for the home computer
ABRACALC
The Commodore 64 Spreadsheet
ABRASCO

"The Abracalc does have one great advantage – its price."

The limitations of this package are not only restricted to the speed of the cursor but also apply to the speed at which data is entered. All the data to be entered first appears on the control line but the user must remember not to enter any more than about 10 characters. This is the maximum and any excess will immediately appear on the screen. Hence it is possible to end up with a screen full of information and letters or digits in places where they ought not to be.

This also applies to arithmetic. It is possible to calculate A1 + B1 but asking the program to calculate A1 + B1 + C1 is another matter altogether. Happily in this instance there is a way out of this problem because there is a limited range of functions like sum and average to calculate a total value between two given addresses. However any calculation takes an awfully long time and in some cases it is quicker to work the answer out mentally rather than wait for this program to do it for you.

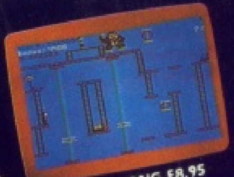
But the biggest criticism of Abracalc must be reserved for its print routine. Even in the manual, the manufacturers admit that the print routine may not work. This they claim is due to the printer not being switched on. For the purpose of this review, the 64 was connected to the 3022 printer via Interpod. Everything was switched on, all the connections were perfect and absolutely nothing happened apart from the screen going totally blank.

We explained the problem to Abrasco and they told us that the program should print using the Commodore 1526 printer. Unfortunately we had no time to test this claim to the full. Abrasco say they are also revising the print capabilities of Abracalc so the program can print out through Epson printers using the RS 232 interface.

In spite of its faults the Abracalc does have one great advantage – its price. Considering its cheapness it's hardly surprising that the program should be lacking in some respects. You get what you pay for, of course, and you don't pay a fortune for Abracalc.

SUPERSOFT

the name to remember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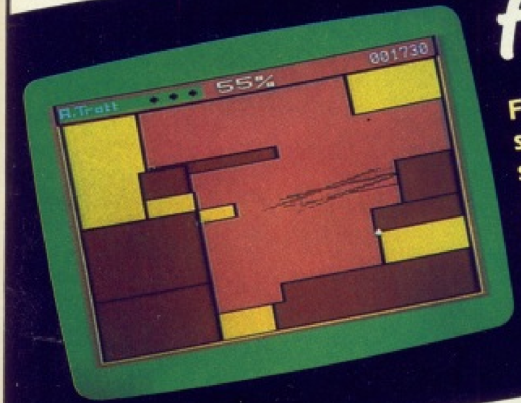

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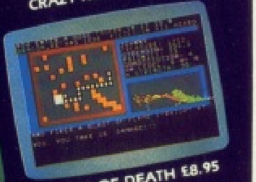
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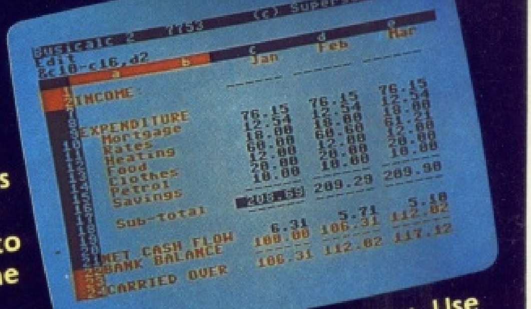

```
Busicalc 2   ?Y153      (c) Supersoft 1983
Edit                        c        d        e
&c10-c16,d2                Jan      Feb      Mar
      a            b      ------   ------   ------
INCOME                     76.15    76.15    76.15
                           12.54    12.54    12.54
EXPENDITURE                18.00    18.00    18.00
  Mortgage                 60.00    60.60    61.21
  Rates                    12.00    12.00    12.00
  Heating                  20.00    20.00    20.00
  Food                     10.00    10.00    10.00
  Clothes                 ------   ------   ------
  Petrol                  208.69   209.29   209.90
  Savings                 ------   ------   ------
                                             5.10
  Sub-total                 6.31     5.71   112.02
                          100.00   106.31   117.12
NET CASH FLOW             ------   ------   ------
BANK BALANCE              106.31   112.02
CARRIED OVER
```

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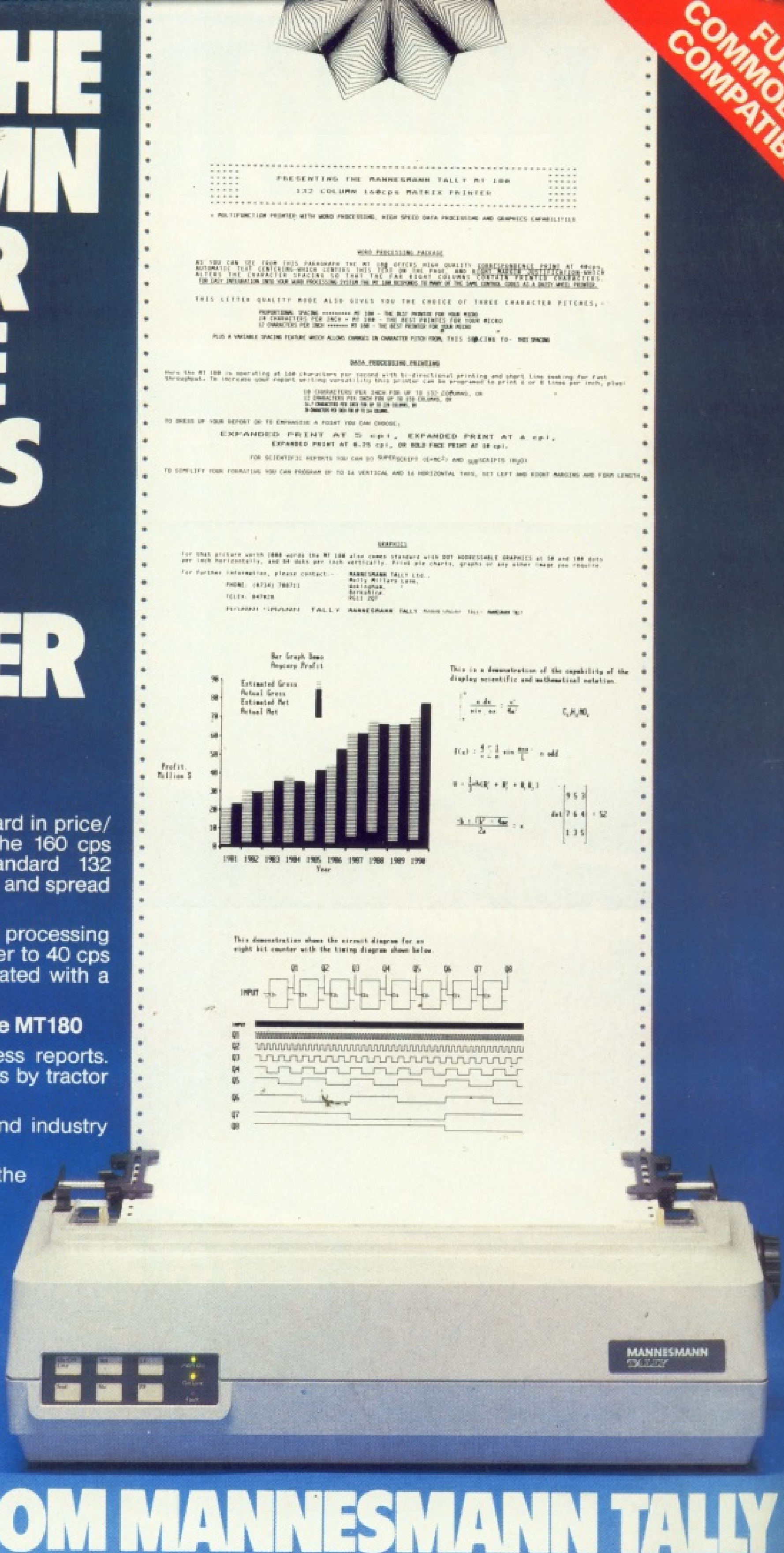

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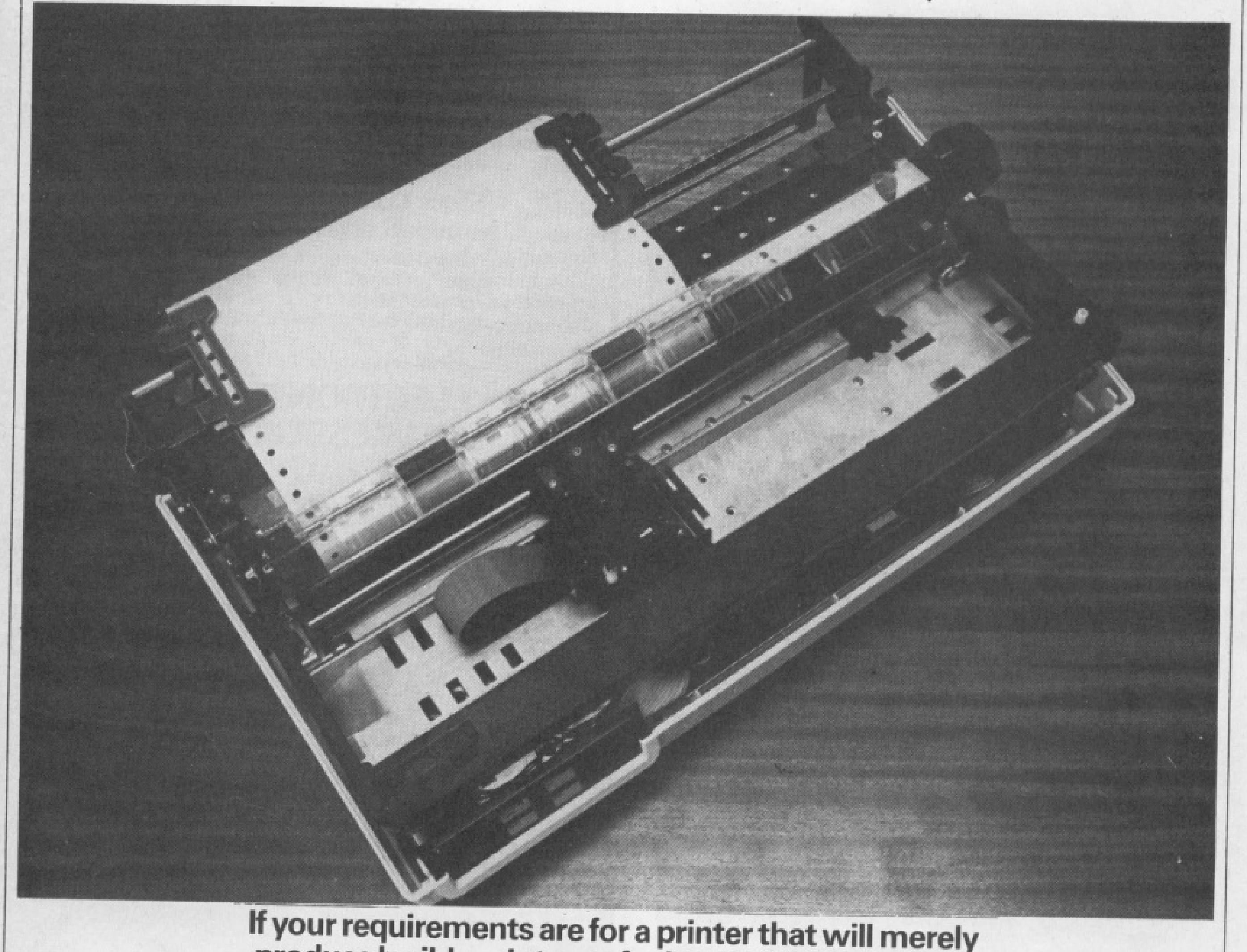

If your requirements are for a printer that will merely produce legible print outs for internal use then your choice is wide. If, however, you need to present print outs to the outside world then you will need a quality printer. We take a look at a the MT180C.

Mannesman Tally have traditionally specialised in dot matrix printers and a recent addition to their range is the MT180C. The one we are looking at is the model for the Commodore with IEEE interfacing. This multifunction printer incorporates data processing, graphics and high resolution printing capabilities.

Features of this 132 column printer include a very high printing speed of 160 cps, a comprehensive variety of character size and pitch and optimised logic seeking

Visually the MT180C is very attractive with its cream coloured casing. Weighing only 7kg the printer is compact, easily transportable and could fit very snugly beside a computer system. The manual accompanying the system is very clear and Mannesman Tally have obviously taken a lot of trouble to get the printer to be user friendly.

Multifunction Performance

The printer can emulate the daisy wheel quality of print, but the speed slows down to 40 characters per second (cps). The MT180C responds to many of the same control codes as a daisy wheel printer so that the user's word processing system can be integrated more easily.

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PETX2

doubles the speed . . .
trebles the memory . . .
. . . of your PET computer!

For users of the CBM/PET 3000, 4000 or 8000 series of computers who want to upgrade to new generation standards, computer specialists J.R. & S. Purdue have developed the PETX2 add-in board. Manufactured to the most exacting standards. PETX2 uses the latest microprocessor technology to double the processing speed of your CBM system, whether running BASIC, Silicon Office, Viscalc or any other application. The system comprises one board positioned inside the computer which can be fitted in 10 minutes using only a screwdriver. The board provides 96K of memory, thus upgrading 32K systems to 96K and replacing current 96K versions. This development means that your investment in software and data is protected, for by enhancing your machine speed, it comes into line with the Sirius, Osborne and even some 16-bit machines, as can be seen from the table of Personal Computer World Benchmarks:

Machine	BM1	BM2	BM3	BM4	BM5	BM6	BM7	BM8	Average
CBM with PETX2	0.87	5.1	9.4	10.3	11.2	16.5	26.0	6.0	17.5
IBM PC	1.5	5.2	12.1	12.6	13.6	23.5	37.4	3.5	17.6
Osborne 01	1.4	4.4	11.7	11.6	12.4	21.9	34.9	6.1	19.9
Apple 111	1.7	7.2	13.5	14.5	16.0	27.0	42.5	7.5	24.7
ACT Sirius 1	2.0	7.4	17.0	17.5	19.8	35.4	55.9	4.3	24.8
Apple 2	1.3	8.5	16.0	17.8	19.1	28.6	44.8	10.7	30.4
Commodore CBM 8032	1.7	10.0	18.4	20.3	21.9	32.4	51.0	11.9	34.3

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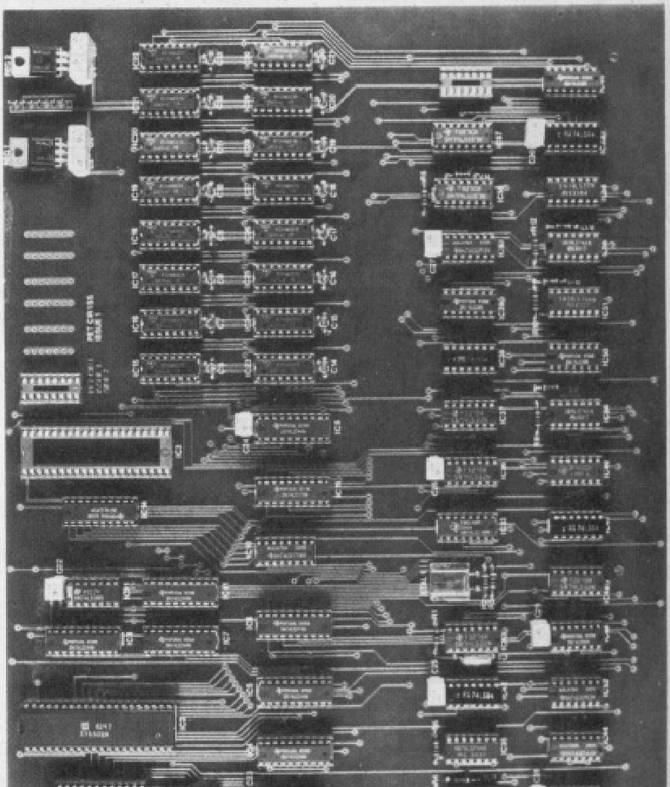


Three choices of character pitch can be used to vary the print size, proportional spacing, 10 and 12 characters per inch. As well as this there is a variable spacing feature to alter the length between each of the characters. Text can be printed out neatly with the automatic text centering function and a right margin justification.

In the data processing mode the printing speed increases to 160cps and prints bi-directionally – the printer head prints on its return journey as well as forward. This means it can print much faster.

Because this mode has a number of features which vary the text size and spacing, there is scope to increase the variety and clarity of the text. The character sizes can vary from 10 to 20 characters per inch and there is a corresponding increase of columns from 132 to 264. As well as this the number of lines per inch can vary from 6 to 8 and expanded print can be altered from 5 to 10 characters per inch.

Especially suitable for writing formulae is the super and sub script function and for the simplification of formating it is possible to program up to 16 horizontal and vertical tabs.

The production of graphics is excellent and it can produce graphs, bar and pie charts, curves and other images without difficulty. Other type styles available are the 96 USASCII and 27 National Characters.

Two forms of paper feed can be used, the friction feed can print onto 3 sheets of paper and on the tractor feed which is optional 4 copies can be produced. The paper is fed through very smoothly and would be ideal for letter heads etc. The fabric ribbon produces a black print which is quite faint, I prefer a darker print.

The touch sensitive panel containing the printer controls gives the printer a sophisticated appearance and is a pleasure to use. The On/Off line indicates when the printer will accept data from an external data source. Two Feed Functions can be used; the Line Feed which is only active when the printer is "off" advances the print one line, with the Form Feed, the paper slews to the top of the next form.

The controls can be combined to carry out other functions, for instance it is possible to get a print out of one line to show the program and character set number. Indicator lights show when the power is on, when the "On Line" is on and allowing data to be received and if a fault occurs, a red light illuminates. Additional controls include knobs to control the paper manually, to regulate the distance between the print head and a paper handling lever.

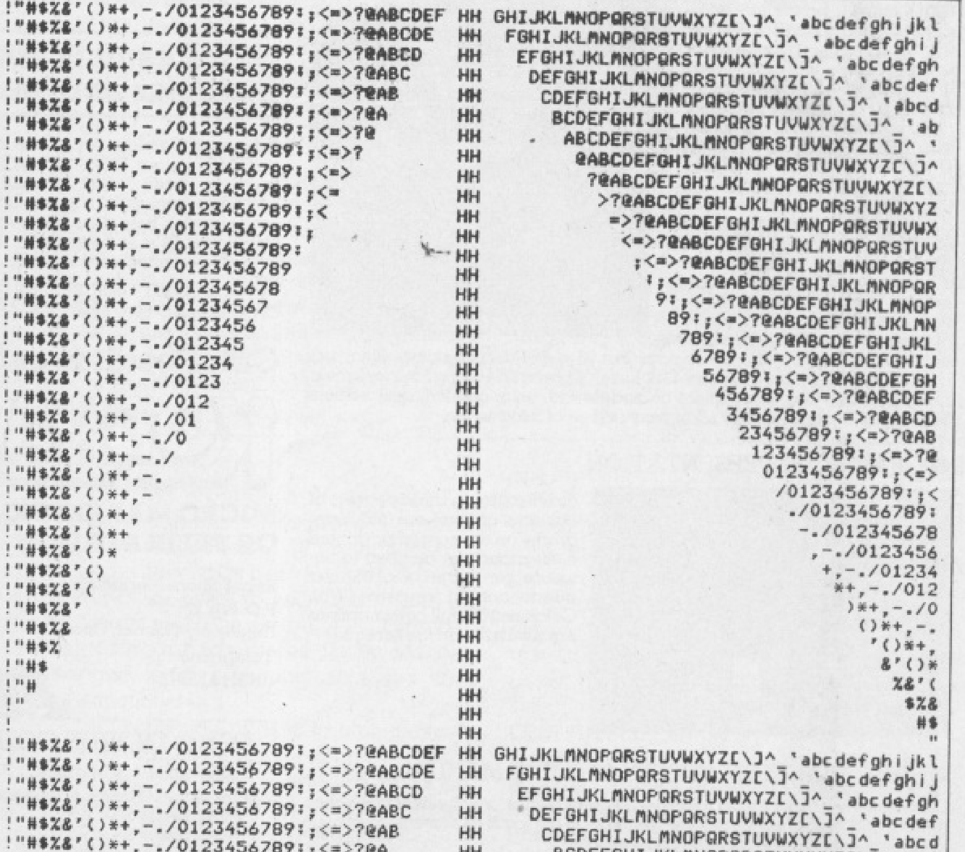
Interface

The Commodore version of the MT180 has the Commodore compatible IEEE 488 I/O and only utilises the listener (output to host) function, responding to commands from the system controller. Text format can either be programmed or selected using the operator panel. Printer configuration can also be done via the computer interface. The manual explains all the necessary codes and sequences. The printer is not compatible with word processing packages such as Superscript and changing the character sets etc. can not be done unless programmed into the computer before hand.

The MT180C is well designed, extremely versatile and a pleasure to use. Designed to suit programable measurement systems, small business systems and the home computer systems this machine would suit most needs and is very good value at £749+vat.

Contact: Mannesmann Tally, Molly Millars Lane, Wokingham, Berks, RG11 2QT. Tel: 0734 788711.

The Mannesmann Tally printer is capable of some highly sophisticated printing. Illustrated here is an example of the unusual printing operation the machine can carry out. This is entertaining but such capabilities also make it a very versatile business machine.



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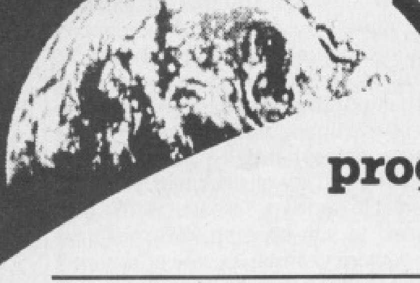

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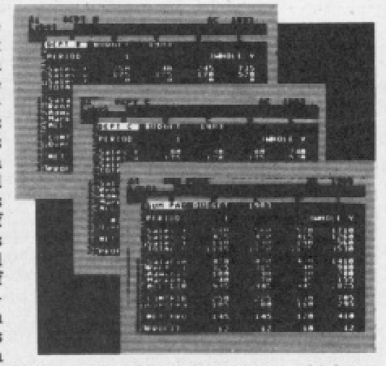

CalcResult's powerful three dimensional spread sheet format rapidly becomes an irreplaceable tool for those involved in figure manipulation and relationship. Budgets reports, statements, forecasts and planning are all areas in which a saving in time and resources are as important as the ability to handle all forms of calculations. The many features of CalcResult simplify the rapid production and calculation of all aspects of business forecasting and planning. Each model can have up to 32 pages of associated information with a consolidated report and every page has 63 × 254 data positions which can contain text, formulas or values. CalcResult's powerful editing functions mean rapid creation and amendment of models and, once created, split screens and multiple page viewing allow easy review of information.

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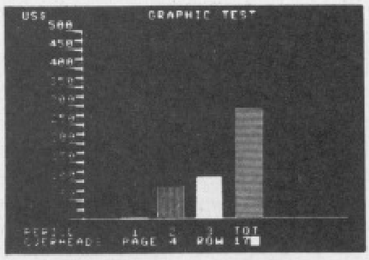

CalcResult can translate rows of columns of numbers into histograms on the screen or printed histograms can be used to enhance presentation of tabular information in reports. (With CalcResult 64 full colour options are available on the screen.)

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What's in a database?

Confusion in the computer world often arises from problems with words. Different people sometimes place slightly different meanings on the same word or different words may be used to describe the same thing. Nowhere is this more apparent than in the area referred to variously as databases, database management systems, data management systems. We begin this look at the products in this area with a clarification of the terms used and follow it with a look at a selection of the major products.

A database is a 'collection' of information. A database management system (DBMS) is a method of managing that information. That's it, simply, in a nutshell. The major cause of confusion is the tendency, especially by software companies, to refer to what is really a database management system as a database.

One example of a database, particularly relevant to us, as a magazine publishing house, would be a subscription list. The list of names and addresses would be the database. As it stands it is simply a list in no particular order, but a suitable DBMS would enable us to arrange the list in aphabetical order, for instance, or into various regions of the country.

The usefulness of a DBMS would obviously depend on how much information we had about our subscribers. We might be able, for instance, to divide the list into personal subscribers and business subscribers.

At its most basic a DBMS could be described as a filing system. The advantages of using a computer to manage large collections of information instead of using a manual system will be obvious. Imagine sorting 5,000 names into alphabetical order by hand. If you wanted a regional breakdown as well and needed regular access to both the alphabetical list and the regional breakdown you would need to set up two sets of files.

A computerised system enables quick and easy access to the information and any identifiable and separable categories of information, usually referred to as 'fields'.

Before investing in a DBMS it is absolutely essential that you know as accurately as possible what you will want it to do. One of the most common errors is to buy a DBMS with general applications for use in an industry with specialised needs. Many database management systems are very flexible and will allow you to decide how many 'fields' of information you want to define within the main file of information.

Even so a university department which wants to sort out information which results from market research will have different requirements from a factory personnel manager responsible for thousands of employees.

Due to the enormous variety of database management systems available, covering every one would be impossible. So our attention is focused on some of the DBMS's used in office management. Their main function is to process and store information in a manner recognised by the business using it. Reports and files have to be easily accessible and they usually cover everything that is needed to keep the office running smoothly. Besides these more generalised office systems, numerous others for the more specialised business concerns, are now in use by, estate agents, solicitors, architects, dairy farmers, and many others.

SIMPLY FILE

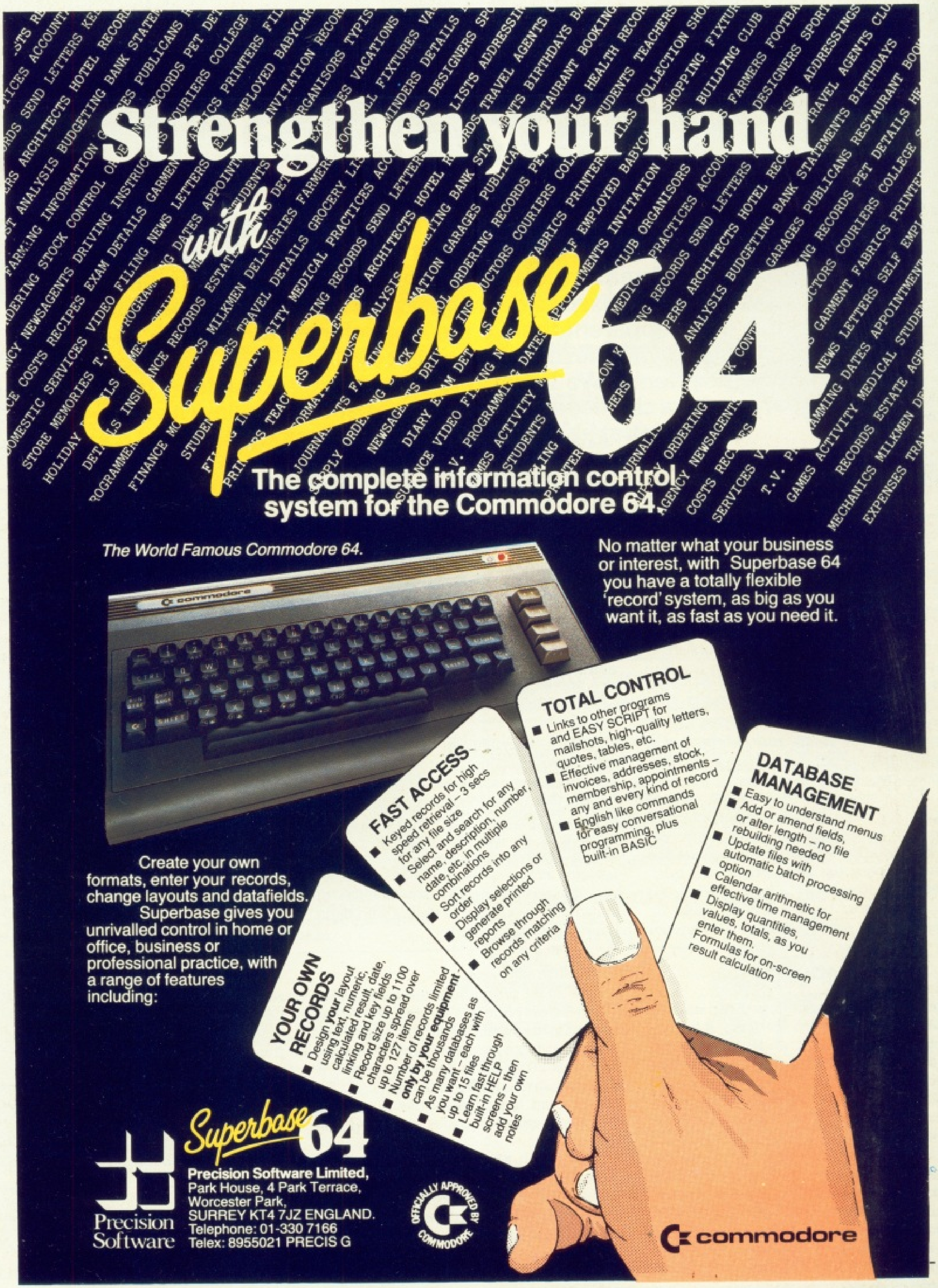
This is a fairly straightforward database management system for filing information, writing reports and mailing lists. Simple Software Ltd have designed it to be compatible with the Commodore PET/CBM and the CBM 64 and Simply File comes with a comprehensive manual and a single floppy disk.

It has been developed to include all the functions necessary for creating files for information storage, creating reports using the data in the files and to print labels for mail-outs etc. Also included in the package is a selective calculation function. A Word processing program is available at extra cost.

The main program is the Simply File and is the only one of a suite of eleven that can be loaded directly, all the others are accessed after it has been loaded. There is a limit of 20 fields to each record and if mistakes are made the file can be restructured. Each of the fields can be changed, added to and accessed for consultation.

Labels can be printed in alphabetical order in any key field, for example in order of surname. To print reports, a number of criteria are available for the user to utilise when designing the report; space for header columns, column tabulation and headings and an option for the user to specify which information is wanted in the report. Apart from the random files there are sequential files which can be used to restructure information from several of the random files.

Nearly 80 per cent of the Simply File packages for the PET are used by schools, universities and technical colleges. Other users include Rank Xerox and British Telecom. More and more users of the CBM 64 and Simply File is used by a variety of people; small businesses, accountants, professional users and even by, ministers to maintain Parish records! Prices are £60+ vat for the CBM 64 and £65+ vat for the PET/CBM.



Strengthen your hand with Superbase 64

The complete information control system for the Commodore 64.

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No matter what your business or interest, with Superbase 64 you have a totally flexible 'record' system, as big as you want it, as fast as you need it.

Create your own formats, enter your records, change layouts and datafields. Superbase gives you unrivalled control in home or office, business or professional practice, with a range of features including:

YOUR OWN RECORDS
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- Record size up to 1100 characters spread over up to 127 items
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- As many databases as you want – each with up to 15 files
- Learn fast through built-in HELP screens – then add your own notes

FAST ACCESS
- Keyed records for high speed retrieval – 3 secs for any file size
- Select and search for any name, description, number, date, etc. in multiple combinations
- Sort records into any order
- Display selections or generate printed reports
- Browse through records matching on any criteria

TOTAL CONTROL
- Links to other programs and EASY SCRIPT for mailshots, high-quality letters, quotes, tables, etc.
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- English like commands for easy conversational programming, plus built-in BASIC

DATABASE MANAGEMENT
- Easy to understand menus
- Add or amend fields, or alter length – no file rebuilding needed
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Superbase 64

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Tomorrows Office

Tomorrow's Office used to be called The Administrator. For £695, the user gets a very thick manual, two program disks and one dongle.

One of the applications that Tomorrows Office is useful for is keeping medical records, using the master record as the patient record and the transaction record as the visit report.

Reports can be the product of all visits in a week or month by the doctor, reports on an ailment by week, month and sex, age and sex register and a drugs register detailing which patient has been prescribed which drug.

It is also possible to use the system as a stock control system. The system keeps four main balances which are kept permanently updated by the entry of transactions. The records, whether in master file or transaction file, can be up to 254 characters long and records in both files are chain linked together.

The package comprises several routines, probably the most important being the creation of the master format. Complete files can be searched very simply using the 'select search' criteria or the simple search. With select search the user can search files based upon multiple fields and various criteria. The simple search allows the user to find data within a field or record.

Such facilities as batch input and update allows the user to update all the records on a daily basis if necessary. It is also possible to get a printout using the view print program. On the medical aspect of the system, the copy/convert program will copy over all the important medical history to a new disk.

With regards to the stock control aspect of the system, the stock valuation report will provide the user with a list of values at cost price as well as a price list. The stock shortages report shows the user the cost of replenishing stock to either minimum level status or optimum re-order quantity so that a decision can be made as to the most economical method of purchasing. Using the global update facility, it is possible to update a suppliers prices with a constant. For instance if all magazines went up by 20%, the user would need to update the price by that percentage. The hardware needed to run this database management system is a CBM 8096, 8050 or 8250 (although the diskettes supplied with the system are in 8050 format) and a compatible printer.

SILICON OFFICE

SILICON OFFICE

For a very long time now, Silicon Office has been regarded as one of the best selling data base management systems around for the Commodore PETs. It is a large, very versatile software system and includes much more than a DBMS.

The system consists of two types of information storing disks, data disks and work disks. On the latter, all the files are sequential and all the file names on these disks are 16 characters long.

The data disks are organised as relative records under Commodore DOS and each record has a limit of 254 characters. The screen picture for a data file is stored in a sequential file and each screen picture consists of 23 screen lines each of 80 characters, a total of 1840 characters per file. The first relative record file is used solely to keep track of where the next record should be added and so the first real data record is actually the second relative record file.

Silicon Office allows the user to centre text, move from page to page, underline text and many other functions. There are many of these functions which are spilt into three sections. The Silicon Office command set comprises of 36 commands and these do not include the 26 commands that form the Text Editor Commands or the many built-in functions.

Using a combination of these commands and functions it is possible for Silicon Office to maintain complete control of the user's records. The records on each file can be updated, deleted and stored. Information in one file can be merged and transferred to another file.

There is also an integrated word processor which means the system can produce reports, accounts and letters with great ease. One feature of the word-processor is its ability to split the screen into two or more vertical columns. The mathematical capabilities of the system are also quite extensive. With the numeric constants, numbers consisting of 14 digits may be stored, although floating point representation is not possible. There are also 64 numeric calculator variables, all of which may be seen using the Display Memory function.

Silicon Office is sold on a world wide basis and is being used by the British Government and by over 40% of the world's top companies. It is difficult to think of many offices which could not make good use of the program because it is a very complete system. The hardware needed to run the system is an 8096 or an upgraded 8032 and an 8050 disk unit. Printers that can be used with the system are more varied, these being the 8024, 8026/7, 4022 and 8023. The cost of the software is £790 plus VAT.

There are many similarities between a manual filing system and a computerised DBMS. The main difference is the speed at which the computer operatues and the space which storage of information takes up.

The basic unit of every filing system is the record – each card in a card index file is a record. A file is usually defined as a number of records in the same format ie with the same fields.

Fields are the separate items of information which make up the subdivisions on the record. On a personnel record in a personnel file the records might be Name; Address; Age; Sex; Date employed; Position; Salary; One of these fields is the keyfield – that item of information which you are most likely to know, to which you will need most frequent access and which is, as far as possible, unique to each record.

Information is retrieved by using one of several searches. The most important is the keyfield search. This is the quickest and simply runs through the file displaying each record. You can also use a criteria search by asking the computer to find records which conform to one or more criteria. Because the computer keeps a separate file of index of each field this is a fast search.

A character string search is the slowest search but it enables you to find records containing information which is not specified as a separate field. In such a search the computer looks for a nominated word or number.

Report generation is an important function of a DBMS. Different systems have different facilities for printing out the information and present it in different ways.

INFODISK

Infodisk 64 incorporates data processing and information retrieval facilities and works on the 64 with either a single or dual disk drive together with most of the CBM printers. It costs £75 and is less expensive than a similar program for the PET which is £150, although the latter has more facilities because of the larger memory.

The Select Data File always has to be chosen first as it contains the main menu and from it, all the records are created. Data can be entered onto the records in any form and design and the file structures can be changed at any time. The system comes with 6 sample applications for prospective users to use. An INDEX for the manual, an INVENTORY which can be used to control stock, INVOICES, LIBRARY which is a book cataloguing system, LIBRARY especially written for storing recipes, and SUBS which is a club subscription scheme.

The package has been used by libraries for keeping records of their books, general administrative and office use and by club secretaries to keep records of their members.

Each record has a variable length of up to 2400 characters, and the records can now hold up to 180 fields. Multiple files can be kept on disk and the record capacity is limited only by the disk. A sequential filing function enables the user to index the records on the disk in a specified order allowing much easier record retrieval.

An important feature of Infodisk is its report generating ability. Reports can be made which utilise any specified information in the files and they can be produced in pages, in linear or in tabular format. If the user is satisfied with a certain type of report format, the structure can be saved on disk for later use.

Another option on the report generating section is the wordpro/seq file. By using this the user can select data, send it to a sequential file for merging with a word-processing program and documents such as statements and invoices can be created. Certain parameters of the printer can be chosen using the printer option and the width and length of pages can be chosen.

Graphic characters can only be obtained on the Commodore printers, but the upper and lower case alphabet and the numeric keys can be used on all makes.

Most of the DBMS include some form of spreadsheet function and Infodisk is no exception. The Selec Calc File allows calculations to be set up and performed on the records either individually as the data is entered or in batches. It is possible to define up to 50 calculations in each file and there is no limit on setting up calculation files.

This powerful calculator contains 19 functions including arithmetic, relational and logical operators as well as character and data manipulation. At the beginning of every session with Infodisk the day's date has to be entered and DAT, a data manipulation function, can utilise this date to locate 'out of date' records or in formulas automatically insert the date. The batch processing option can be used to update whole or parts of a file and produces various summary totals or deletes selected records.

The package comes with a manual and a single floppy disk. The 64 version has only just been launched and Beaver Software Systems intend to market it as a user-friendly system suitable for the home and small businesses.

DMS DIAMOND

The DMS Diamond from Compsoft is an information storage and retrieval system capable of storing up to 1016 characters per record. The hardware needed includes an 8032 or 8096, any Commodore disk drive except a 3040 or 2040, any compatible printer and the DMS dongle. The price has recently been reduced from £400 to £195!

At the moment there are more than 4000 DMS Diamond systems in operation, a large number are used in hospitals for research and administrative purposes. It is possible for DMS to store details about patients from which a researcher can trace trends in illnesses and diseases. This sort of test can be carried out using the search facility and specified parameters, of which there may be a maximum of eight.

It is easy to see that such a system could also be adopted for stock control, personnel and client records. DMS will show where stock level has fallen below the minimum and produce a re-order list. The spread sheet part of the system will also work out the recommended selling price based on cost price, sales costs, fixed margins etc.

With personnel records it is possible to produce lists of all personnel to suit several criteria. These lists can be printed, viewed on screen or merged with other data fields.

Using the calculations features it is possible to add, subtract, divide or multiply numeric data with constants or other fields.

However, before any file can be created, the disk must be configured by entering hardware and software specifications. Entering and amending data is done by two methods, either through the standard screen display or through formatted screens that have been created by the user to suit individual needs.

Creating screen formats has several advantages. By doing this the user can expand prompts and create or miss out certain fields.

It is also possible to use the system to generate reports and letters. The DMS Diamond can print lists in sorted order using either all records or only those that meet various parameters.

In batch processing, there are two options that can be used, PROCESS and PRORUN. The first of these options allows the user to set up various processing routines which may be purely mathematical but each routine may be recalled in PRORUN to perform the processing on a group of records.

Information in one drive can be copied in the other drive. Using the link option, the information can be written to an intermediate file and then read into a new format.

Superoffice

Superoffice is a complete information control system for the 8096. The manufacturers specify that the system is ideal for personnel, customer/client records, stock and subscription handling.

The user defines the report and the screen format unless an off the shelf application is used. There is a step by step guide enabling the user to create the files and the size of the record may surpass 1000 characters although there is a limit of 128 items per record.

There is no need to link the system up to a word-processor because there is a word-processor already built into the program. This will use lists selected from data files for mailshots, tables, forms and the production of labels amongst many others.

Another built in feature of the system is a 30,000 word expandable dictionary and a comprehensive document editor. This editor includes instant text reformatting and the ability to see the printed format of text on screen before the text is actually dumped out on to the printer.

The width of the screen can be altered to accommodate 240 characters for tables and a linked file feature gives unlimited document length. The cost of this system is £850 for floppy disk and £950 for the hard disk version. It is available from Precision Software.

The Manager

The Manager is a sophisticated set of programs designed to run on the 8000 series in conjunction with any 80 or 132 column CBM or ASCII printer.

The record formats are completely user-definable and each record has a maximum record length of 254 characters. The maximum number of records is set at 16,000 although there is no limit on the number of datafiles. The length of each field is limited to 79 characters although there is a total of up to 120 data fields spread over two input screens.

Finding specific records is fast, easy and efficient using the sort facility. The sort can be performed in either descending or ascending alphabetical or numerical order and up to 20 criteria can be defined.

These reports can be output more than one at a time with wordprocessing by either Wordpro or Wordcraft. Once these files have been created they can be modified, summarized, sorted and rearranged. The Manager is available from Commodore or from Commodore dealers, price £275.

The Executive

The Executive is an electronic filing system which allows the user to store information in any form and link it to a word processing program so that information can be extracted from the records. The system is designed to run on the 8000 series and the cost is £645. No specialist skills are required to operate the system apart from understanding screen prompts and the design record formats. One of the first files created is an index file which can be used for high speed index searching. Once a document or report has been created on screen, it will display the finished format of the document in the fixed spacing mode. Also on the screen, there are five status indicator lines for information such as document name, width, length and the number of the page that is currently being displayed.

Also included in the system are several wait points to allow the changing of print wheels or thimbles during the actual printing process. The Executive is available from Dataview Limited.

Superbase

Superbase is a record management system for the Commodore 64, 8096 and the 700 series. It combines user-friendliness with the ability for users to define records to suit their own needs, retrieve records and process files.

One of the many options available is the ability to link the system to the Easy Script word processor. Each database consists of up to 15 files and as soon as the system starts up, one of these files is selected as the current file.

This is a menu drive system with a double menu of options which may be selected by function key or by typing the name of the function. It is one of these functions that leads to a further menu of housekeeping commands for taking back-up copies, initializing disks and other essential tasks.

All new files are created using the FORMAT option which (along with the ability to redefine field length without having to reconstruct the files) will allow the design of up to four screens for the record format and makes use of seven different types of field. It is possible to get 127 separate files with a maximum text field size of 255 characters. The file size is the number of records that each file is capable of accepting and this is only restricted by hadware constraints.

Once a record format has been defined, new records can be created through the ENTER option which displays a clean record format on screen for the operator to fill in. Records can also be added by taking advantage of the menu which allows for the retrieval of records from the current file. Records may be browsed through, edited, replaced or added. There is also the option to search for a particular set of records.

On the processing side, CALC is the main evaluation command. This can be used to change the contents of any type of field within records or obtain values. Such an operation can be carried out record by record or by a complete file or set of records. When sorting a file, it is necessary to specify the particular field or part of field.

One of the most important features about the system is the programming option which enables Superbase to become an applications generator and database programming language as well as a database management system. This option means that advanced users can utilize more than 40 added BASIC commands. User-defined programs have a maximum of 4K at their disposal.

The cost of the system is £99.95 inclusive of VAT and for that price the user will also get a very comprehensive manual, and a user registration form entitling the user to Precision Software's newsletter. One thing Superbase 64 will not cater for is graphics.

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PRODUCT SURVEY

Product: DMS Diamond
Manufacturer/Supplier:
Compsoft Limited, Hallams Court, Shamley Green, Guildford, Surrey GU4 8QZ. Telephone 0483 898545.
Hardware Requirements:
CBM 8032/8096, any Commodore disc drive except 3040/2040, printer, DMS Dongle.
Price: £195.
Special Features:
Number of characters per record 1016
Number of characters per field 254
Number of fields per file 40.

Product: INFODISK 64
Manufacturer/Supplier:
Beaver Software Systems, Harby Lane, Stathern, Melton Mowbray, Leicestershire LE14 4HJ. Telephone: 0949 61318.
Hardware Requirements:
CBM 64 single or dual disk drive.
CBM printer.
Price: £75.
Special Features:
Number of characters per record 2400
Number of characters per field 80
Number of fields per record 180
Number of records per file is dependant on the size of the disk with a 1541 disk. This number is at least 400. With an 8050 the number is about 600.

Product: The Manager
Manufacturer/Supplier:
Commodore UK, 675 Ajax Avenue, Slough, Berkshire, SL1 4BG. Telephone 0753 79292. Commodore approved dealers.
Hardware Requirements:
CBM 8000. Any 80 or 132 column CBM or ASCII printers
Price: £275.
Special Features:
Number of characters per field 79.
Number of characters per record 253.

Product: Silicon Office
Manufacturer/Supplier:
Bristol Software Factory, Thornton House, Richmond Hill, Clifton, Bristol BS8 1AT, Telephone 0272 735022.
Hardware Requirements:
8096 or upgraded 8032, 8250, 8050 disk drive, 8024, 8026, 8027, 4022 or 8023 printers.
Price: £790 plus vat
Special Features:
Number of records per file using an 8250 restricted by disk capacity. Using an 8050 number of records per file is 700.
Number of fields per record restricted by screen size.
Number of characters per record 252.
Number of characters per field 78.

Product: Simply File 64
Manufacturer/Supplier:
Simple Software Limited, is Havelock Road, Brighton, Sussex BN1 6GL. Telephone: 0273 504879.
Hardware Requirements:
CBM 64, or PET 2040/3040/4040/8050 disk drive any compatible printer.
Price: £60 plus VAT for the 64. £65 plus VAT for the PET.
Special Features:
Number of characters per record 254.
Number of characters per field 79.
Number of records per file depends on application. A typical number is 450 full block records.
The standard number of fields per record is 20.

Product: Superbase 64
Manufacturer/Supplier:
Precision Software, 4 Park Terrace, Worcester Park, Surrey KT4 7SZ. Telephone 01-330 7166.
Hardware Requirements:
CBM 64, 1541 disk drive or any larger Commodore disk drive, any Commodore printer.
Price: £99.95
Special Features:
Number of records per file restricted only by disk drive capacity.
Number of fields 127.
Number of characters per field 255.
Number of characters per records 1108.

Product: Tomorrows Office.
Manufacturer/Supplier:
Stage One Software, 300 Ashley Road, Upper Parkstone, Poole, Dorset BH14 9BZ. Telephone 0202 735656.
Hardware Requirements:
CBM 8096, 8050 or 8250 disk drive, any compatible printer.
Price: £695.
Special Features:
Number of records per file dependant on format set up.
Number of fields per record 60.
Number of characters per field 79.

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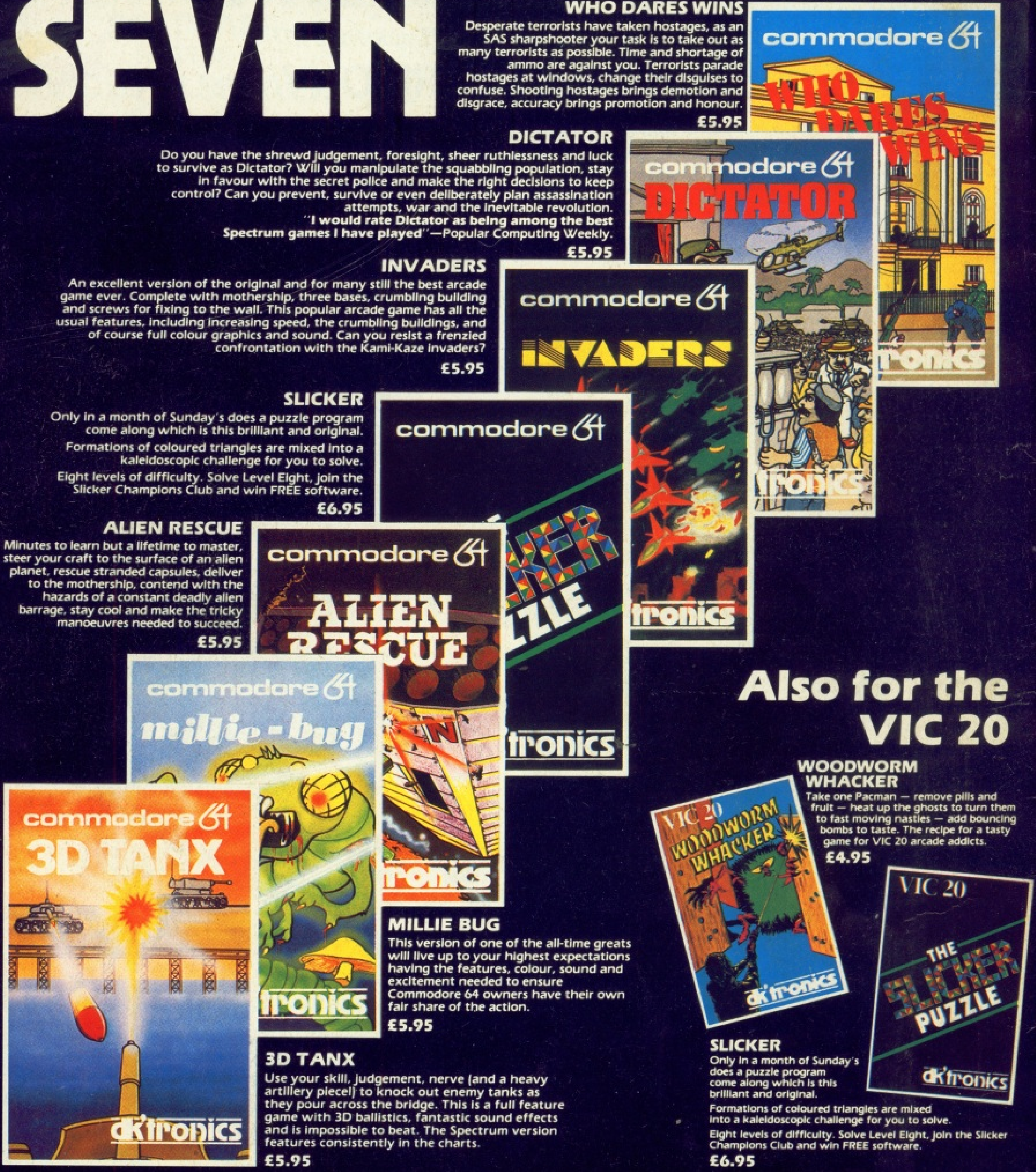

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